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SHIFTING OF POPULATION GROWTH AFFECTS TELEPHONE FIELD

The taking of the federal census this year means a great deal to American industry. Primarily, this counting of the inhabitants was meant to keep tab on the growth of population and put in the official records various sorts of information concerning the development of our people.

The 1930 canvass is designed to collect more details and additional data than ever before attempted, all of which is due to the Washington craving for information regarding the citizens of the republic.

Engineers are keen on getting the facts, and President Hoover runs true to the form of his profession in this particular. Probably this had considerable to do with the enlarged scope of the census now being taken.

* * * *

No line of business is more interested in the revelations of the census than is the telephone industry. The reason is plain. The census deals with people—the rate of population growth, the shifting of the increase here or there, the numbers of householders, the owners of homes, radio sets, etc.—and the telephone business deals direct with people.

It is a personal service which telephone companies render, and hence they are tremendously interested in the vast volume of information that the census is collecting relative to the folks who compose the nation and who also comprise the list of customers of the telephone.

A feature of the fragmentary reports so far made by the census bureau which has attracted much attention is the showing that many of the smaller towns have lost population since 1920 when the previous census was taken. Rural communities have lost inhabitants to neighboring industrial centers, and people who formerly lived on farms have gone elsewhere to earn higher wages. These conditions present problems to all business concerns, including telephone companies.

Of course, there has been no loss of population, taking the country as a whole; on the contrary, it is expected that a sizable gain will be seen when the final figures are compiled. At the same time the shifting of population means readjustments, and compels business concerns to do a lot of figuring to meet changed conditions.

* * *

The June bulletin of the Kansas Telephone Association devotes several paragraphs to conditions revealed by the census reports as affecting the telephone situation in that state, and draws some conclusions that are of interest. Here is how Secretary A. R. MacKinnon interprets the shift in rural population:

"Is this census that has just been completed just something to read to find out how much larger your town is than Podunk? Or is it something to study to see if there is anything of interest to you as a telephone man? I wonder if you analyze it like I do.

The trend of population in Kansas, an agricultural state, is towards the nearest large town or county seat. This is an accepted fact. Now we will study opinions. Why is this change taking place?

Good roads is the answer. Why should the farmer make his family live with him on the farm with all its inconveniences and hardships and cause his children to walk miles to school during the cold and stormy weather, when with good roads he can have his home in a large center, where there are the best of schools and the kind of atmosphere his family wants and craves for?

He can jump into his car and in 30 minutes is out at the farm ready for work. The better the roads become, the more farmers will see the light. He will be a business man the same as his neighbor, with his office to go to every day. He can carry his lunch. I am not much of a farmer, but that is what I would do if I were one.

* * * *

"In Western Kansas, in the big wheat section, the farms are becoming larger and larger, and the time may come when the smallest farm will be 10,000 acres, and operated by a corporation. This corporation will have no local interests, but will be operated from a large center.

Mr. Van Riper, of the Penalosa Telephone Co., tells me that on 50 farms in his section all the houses and buildings and trees have been torn down to make room for more wheat. That means 50 fewer telephone subscribers and 50 less families dependent upon Penalosa and neighboring towns for supplies.

* * * *

"What will become of the small towns? The roads are being made better and better each year. What will the next census show?

This same system exists in France and Germany today and has existed for many years—the farmers live in the towns and drive out to work each day. Our farmers with their cars can travel ten miles while the French or German farmer is going one mile with his oxen or his horse. This will be a joke on the politicians, who are working so hard to give the farmer good roads, for they will move into town, get a different viewpoint of life and may change their politics. As Will Rogers would probably say, 'This is what makes Republicans out of Democrats.'

From the telephone men's viewpoint it looks as though our worries as to how to give the farmer service and induce him to pay for it will be over, for the farmer will become a business man and will recognize his telephone as a business asset and will pay for the service. Our country telephones will be fewer, but will show us a profit for the first time in history. What is your opinion?"

* * * *

As a matter of fact, the removal of farmers from the farm to the town will not reduce the total number of telephones. If there are fewer stations in the country because the farmers have moved to town, there should be more stations in the towns, for if the farmer becomes "a business man" he will certainly want service between his home (or office, as the bulletin puts it) and his place in the country.

Larger farm holdings may mean fewer individual farm-owners, but the larger the operator the more he will need service facilities—and the more likely he will be to have them.

What may be the rural telephone line's loss ought to be the gain of the company operating in the surrounding towns to which the farmers have moved. One thing is certain, and that is that no matter what radical changes may come, increased efficiency and greater progress will require more and better telephone service.

COMING CONVENTIONS

Telephone Associations of Vermont, Hotel Van Ness, Burlington, June 26 and 27.

Wisconsin State Telephone Association, Hotel Schroeder, Milwaukee, August 5, 6 and 7.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, November 12 and 13.

Plows for Laying Tape-Armored Cable

Experiments by Southwestern Bell Telephone Co. With Plows for Laying Tape-Armored Cable, Eliminating Digging of Trench—Plow Equipment Evolved and Used in Completing Installation of the Oklahoma City-Tulsa Toll Cable

By C. W. Nystrom,

General Outside Plant Engineer, Southwestern Bell Telephone Co., St. Louis, Mo.

In an article on "Modern Long Distance Cable Construction" appearing in the April 5, 1930, issue of TELEPHONY, a description of a plow used for breaking up rocky formations beneath the soil in connection with tape-armored toll cable construction was given. The success of this trenching plow was such that it was believed tape-armored cable could be installed with a plow and make the digging of a trench for it unnecessary.

About the same time as the tape-armored toll cable work described in the article in TELEPHONY was in progress in Texas, experimental installations of tape-armored exchange cable were being made in the vicinity of St. Louis, Mo. The plow shown in Fig. 1 was borrowed from a local wire-using company and some 600 or 700 feet of 50-pair tape-armored cable placed with it.

The reel of cable was set up at the point where underground construction was to start, the end of the cable attached to the bottom of the blade of the plow, and the latter pulled along by the winch line on a small tractor. Thus the shoe on the lower part of the plow cut a "mole hole" in the ground, and the cable was pulled into this hole as the plow proceeded.

No difficulty was experienced, insofar as pulling the cable in this hole was concerned, but the trial was not entirely successful as the plow "rode up" out of the ground and the cable was not buried deeply enough.

A different type of plow was then purchased. After some modifications, it appeared as shown in Fig. 2. The same principle of cable-laying was used as tried out with the first plow; that is, the cable was pulled into the hole made by the shoe of the plow. Fig. 3 shows the second plow in operation.

With this machine the cable remained at a proper depth as the plow did not "ride up." Since no trench was dug, back-filling was unnecessary, but a tractor was run over the disturbed earth to pack it down.

The plan of laying cable with a plow is not new, as various methods have been used in the past. One, for installing electric light and power cable, is to feed the cable through a pipe attached to

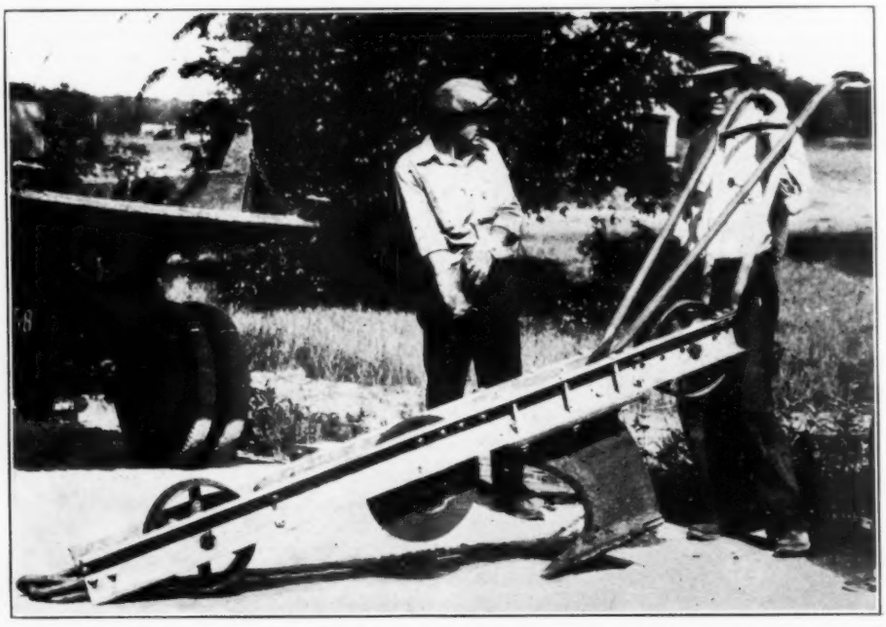


Fig. 1. First Cable-Laying Plow Which Did Not Lay Cable Deep Enough, Due to Plow "Riding Up" Out of Ground.

Fig. 2. Second Type of Cable-Laying Plow Using Same Principle of Laying Tape-Armored Cable as Plow Shown in Fig. 1.

the back portion of the plow blade.

The cable, in some cases, is first laid out on the surface of the ground and carried through the pipe; in others, the reel of cable is hauled along with the plow and cable fed into the pipe as the plow proceeds. It is understood that somewhat similar plans have been used in foreign countries.

As far as the writer is aware, however, the Southwestern Bell company is the first to attempt the installation of tape-armored cable by the plow method.

The second tape-armored toll cable placed by the Southwestern company was one between Oklahoma City and Tulsa. It was laid with a plow designed by and built under the supervision of F. B. Pitts, supervising construction foreman. The essential parts are shown in Figs. 4 and 5. The plow and reel of cable are drawn by two tractors as illustrated in Fig. 6.

Another ingenious device associated with this plow is an automatic backfiller. Since no trench of the usual type is dug, relatively little earth is thrown out by the plow. However, there is a slot of appreciable width opened up and as some earth is thrown at the side of this slot, a certain amount of backfilling is required.

The automatic backfiller is exceedingly simple. It consists of two I beams held together by yokes. The distance between the I beams is less at the rear end than at the front; and, as the backfiller is dragged along by chains attached to the plow, the disturbed earth is forced toward the rear or narrow end of the device and deposited in, and over, the slot made by the plow. This backfiller is also shown in Fig. 6.

The resistance of the earth to the plow is considerable. It was found that the cable-laying plow would operate more successfully and with greater speed if a slot were first cut through the earth to the same depth to which the plow was expected to lay the tape-armored cable.

A plow with only the blade and shoe point, Fig. 7, was, therefore, first pulled through the earth. This operation broke tree roots, large stones and opened up hard soils so the cable-laying plow could proceed.

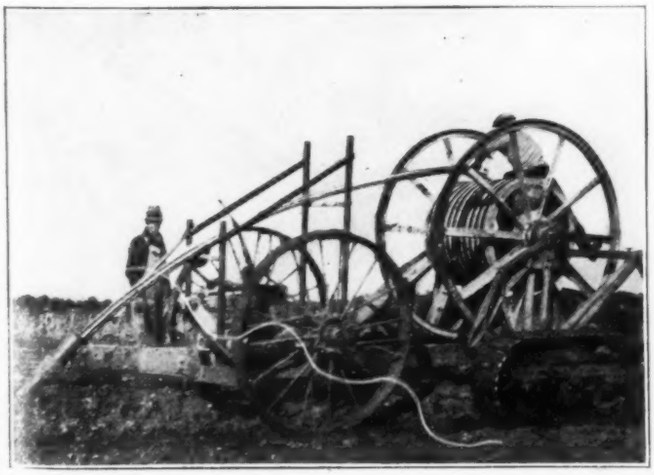
The installation of tape-armored cable by means of the cable-laying plow is of more than passing interest. Contrast the more usual trenching operation shown in Fig. 8 followed by cable laying in Fig. 9 and final backfilling, Fig. 10, with the combined operation illustrated in Fig. 6. The cable plow method is very much faster, even if it is necessary first to cut a slot by the machine shown in Fig. 7.

It is to be expected that some improvements would result from the experience with the Oklahoma cable-laying plow as first constructed.

Difficulty was met in keeping the plow from "riding up," resulting in the cable not being buried deeply enough. Also the depth to which that plow would bury cable was from 20 to 22 inches, while it is desirable that at least 28 inches of cover be provided. Furthermore, the commercial plow chassis was not rugged enough to withstand, for a long period, the severe strains to which the machine is necessarily subjected.

The principle of the Oklahoma type of

Fig. 3. Second Type Cable-Laying Plow in Operation. Backfilling Was Unnecessary, But Tractor Was Run Over Earth to Pack It Down.



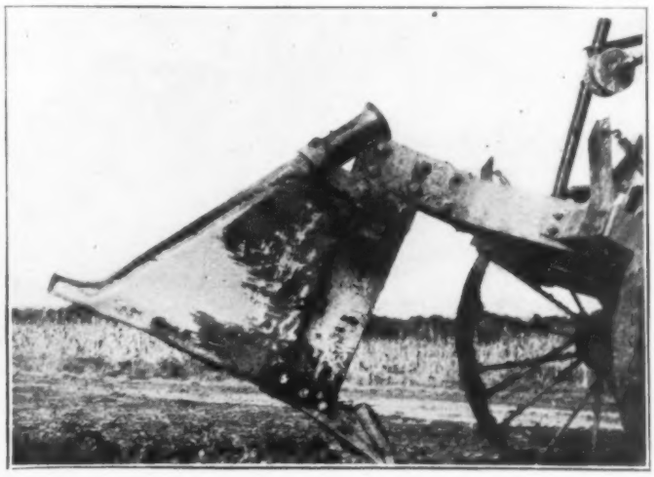
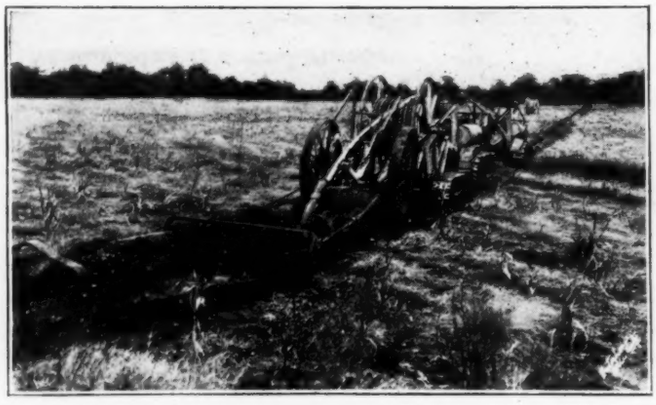


Fig. 4. Cable-Laying Plow Outfit Used in Oklahoma Between Oklahoma City and Tulsa—Fig. 5. A Close-Up of Cable-Laying Plow.



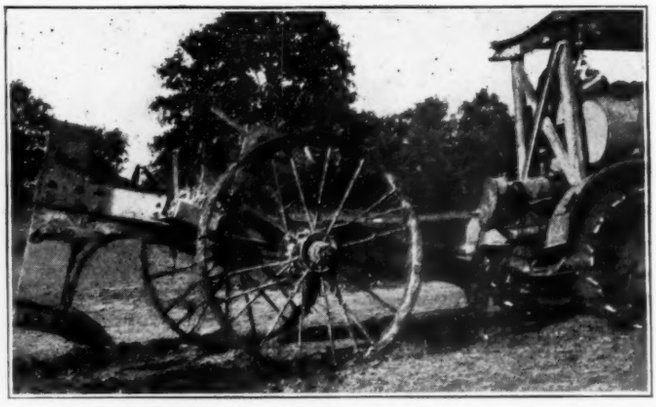


Fig. 6. Cable-Laying Plow and Reel Drawn by Two Tractors in Operation with Backfilling Attachment—Fig. 7. Slot-Cutting Plow Which Preceded Cable-Laying Plow and Broke Tree Roots, Large Stones and Opened Up Hard Soils.

plow appeared sound, however, and under the supervision of M. T. Garlinger of the American Telephone & Telegraph Co., a second plow was designed, built, placed in operation, and it completed the installation of the Oklahoma City-Tulsa cable.

Fig. 11 is a general view of the re-

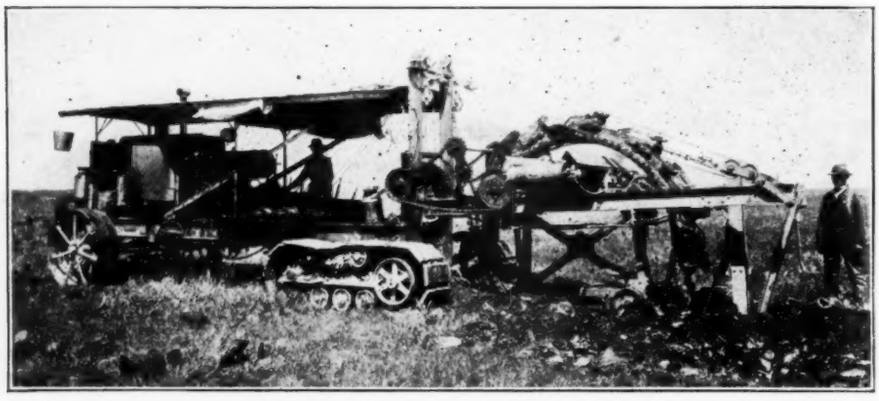


Fig. 8. Trench Digging Machine, Used Before Cable-Laying Plow Was Devised.

designed machine attached to the cable reel trailer. In Fig. 12 the details of the plow point and cable-feeding pipe are shown. The central portion of the machine is lowered to the required depth at the start of the cable-laying operation. Fig. 13 gives a view of the entire outfit—tractors, cable reel on trailer, plow and backfiller.

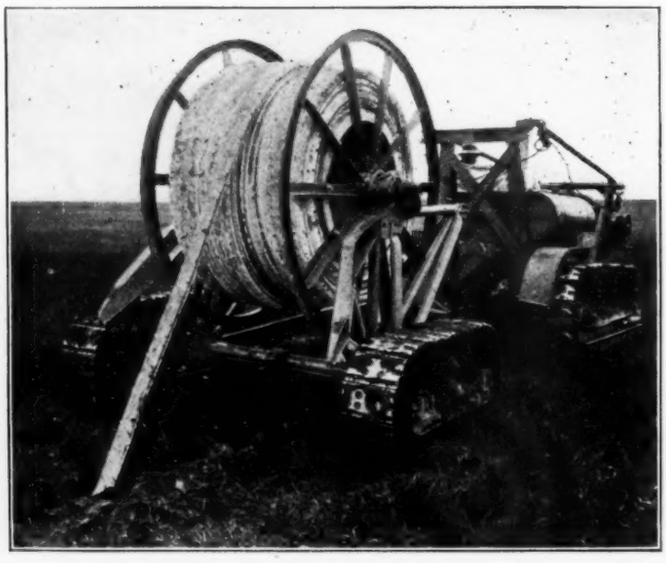
It will be noticed from Fig. 11 that the new plow is a much more rugged machine than the one first built, Fig. 4. It does not "ride up" and will lay cable with a 28-inch covering of earth. It is now operating between Kansas City and Joplin, Mo., and recently in one day 9,000 feet of cable were buried. This is the best performance made by any cable-laying method so far used in the Southwestern Bell territory.

It is not believed that all the possibilities of laying tape-armored cable by the plow method have been exhausted and some further improvements are under consideration. These will probably be watched with considerable interest.

Large Cast Iron Pipe Used for Submarine Cable Tunnel.

The largest cast iron pipe ever manufactured will be used in the construction of a submarine telephone tunnel to be built under the Harlem River, New York City, between Second Avenue and East 129th Street, Manhattan, and Lincoln Avenue in The Bronx, beginning early this summer. This subway, which will be perhaps the largest for its purpose in this country, is one of the chief engineering projects involved in the New York Telephone Co.'s provision of larger facilities for the increasing use of toll and long distance service between Greater New York and New England and Canada.

Approximately 614 feet of this huge pipe, weighing about 1,700 pounds to the foot, will be used. Under the river it will be seven feet in diameter, widening to nine feet at either end where it will terminate



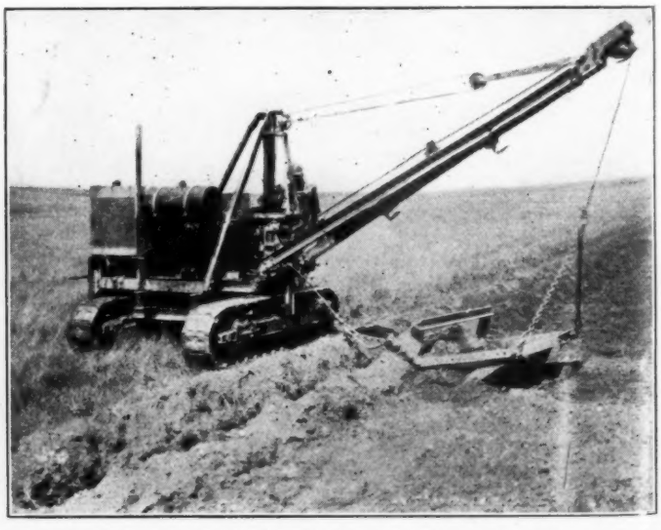


Fig. 9. Laying Tape-Armored Cables in Trench Made by Digging Machine—Fig. 10. Backfilling After Cable Was Placed in Trench.

in manholes sunk 16 feet below street level. The iron tube will be incased in concrete and the whole supported 27 feet below the mean low water level at this point by piles driven into the bed of the river.

The subway when completed will contain 148 clay ducts, enough to carry some 150,000 telephone circuits, or about 300,000 separate copper wires. The circuits to be housed in these ducts will carry some of the heaviest long distance traffic in the world, telephone engineers point out, as calls between thousands of points westward, which pass through the company's long distance central offices in New York, as well as calls from points in New England and Canada originating in New York City, will be handled over this cable route.

Two methods of construction will be used in laying the large pipe. Excavation for the dry-land pieces will be made by driving cofferdams from the sites of the manholes almost to to the bulkhead lines on both sides of the river, while the foundation for the under-river part will be prepared by dredging the bottom of the stream.

The large ends of the pipe, which weigh about 24,000 pounds each, will be swung into "cradles" made by piles driven into the ground at the bottom of the excavations, the ends of which will be left protruding to form the skeleton of the concrete form. After the concrete has been poured and allowed to harden, the ends of the cofferdams will be removed, and the laying of the under-river span will be started.

A "cradle" similar to that used in the land construction will be built in the trench dredged in the river bottom. The pipe will be lowered into this cradle in 60 foot-sections. These 107,000 pound sections, composed of smaller pieces of pipe already fastened together and calked, will be towed into position on a barge and placed by floating derricks. Divers will then fit the ends of the sections to pipes already in place, and after the entire crossing is finished, concrete will be poured under the water to form a coating two feet thick on the top of the pipe and a foot and a half on the sides.

The tunnel will then be pumped dry and the whole structure allowed to settle several weeks before the clay conduits are placed. The company's plans call for the pulling of the first cable through the tunnel in January, 1931. As many of the present submarine cables under the river are entirely adequate, there will be no general rerouting of cables through the tunnel at this time. Instead, the passage will be used to contain new cables. Protected by this triple coat of concrete, iron and clay, these cables will be safe from the hazards of both water and weather.

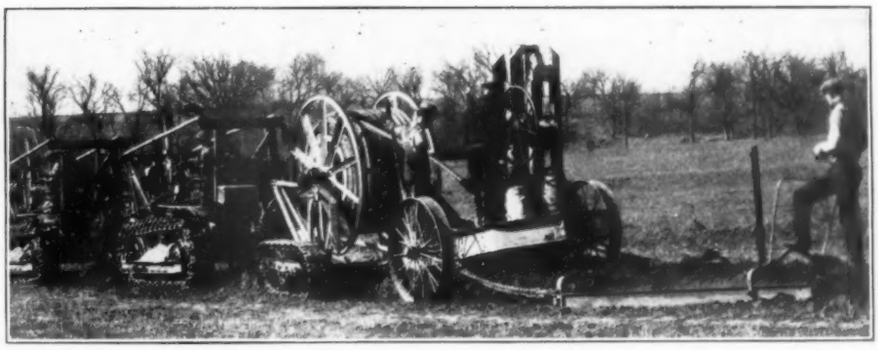


Fig. 13. View of Entire Outfit—Tractors, Cable Reel on Trailer, Plow and Backfiller.

Fig. 12. Details of Plow Point and Cable-Feeding Pipe.

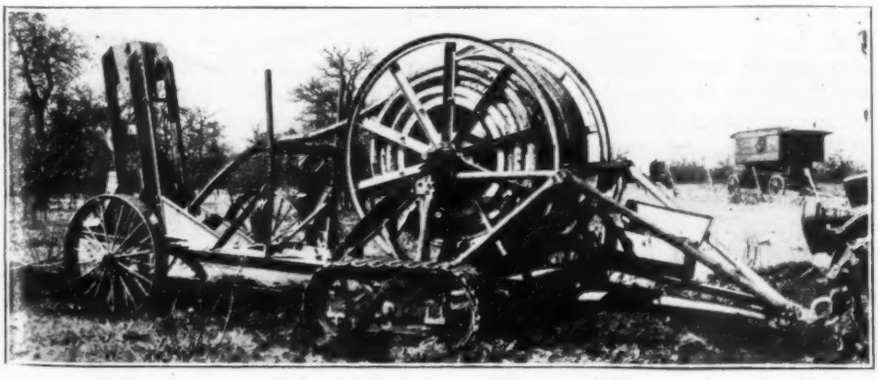


Fig. 11. General View of Redesigned Cable-Laying Plow Attached to Cable Reel Trailer Used to Complete Installation of Oklahoma City-Tulsa Tape-Armored Cable.

Statistics of Telephones in the United States.

At the end of 1929 the total number of telephones in the United States was 20,233,000, an increase of 892,000 during the year.

These telephones were served through 19,915 central offices operated by 8,177 companies, of which 25 constitute the Bell system, the remainder being the Independent systems and companies.

Of this total, only 136,000 telephones are so located as to be incapable of interconnection with those of the Bell system and connecting companies. Through radio-telephone connections, it is now possible for more than 20,000,000 telephones in the United States to be connected to points across seas. Approximately 86 per cent of the world's telephones, which are estimated to be about 34,500,000, are now capable of complete interconnection.

More than 4,000,000 telephones in the United States are now served from dial system central offices.

More Mexican Telephones Connected to Bell System.

A second telephone network in Mexico was brought within reach of Bell system telephones and Canadian telephones on June 12, when service was extended to the stations of the Ericson Telephone Co. in the southern republic. This system covers some 40 cities and towns in the eastern section of Mexico from the Rio Grande river to the vicinity of Mexico City.

Telephone service between the United States and Mexico was opened in 1927. This new extension brings the total of interconnected telephones in North America to over 21,000,000. These include Bell and Bell-connecting stations in the United States and telephones in the principal cities of Canada, as well as Mexico. The Ericsson company has approximately 25,000 stations in Mexico City and several thousand additional in the rest of Mexico.

Telephony and the Vibrations of Sound

Here Is Presented Part V from the Chapters on Sound in the Forthcoming New Volume, "Telephone Theory and Practice," Parts of Which Are Being Given Advance Publication in "Telephony"—Component Tones of Complex Sounds

By Kempster B. Miller

There are various oscillographic devices by which a small beam or pencil of light is made to vibrate sidewise in accordance with the sound whose wave form is being studied. This beam, shining on a photographic film that is being drawn along at a uniform rate in a plane to which the beam is perpendicular, leaves a record on the film.

When the beam is standing still in its normal position, it draws a straight line. but when it is thrown into vibration by the sound wave, it draws a wavy line corresponding in its displacements from the normal or axial line with the varying amplitudes of the sound vibration.

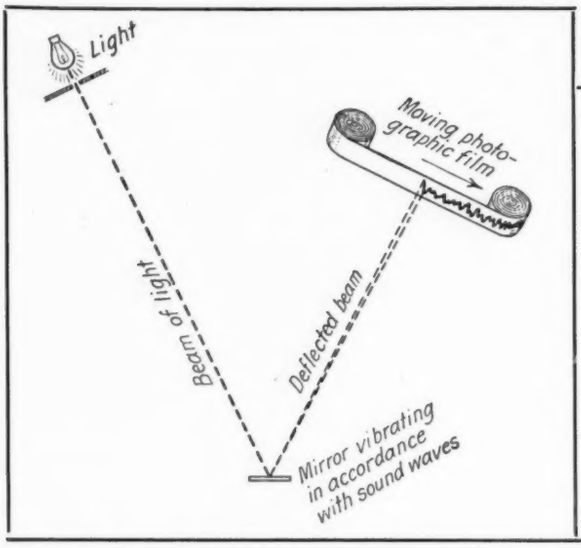
In some of these devices the beam of light is deflected by means of a minute mirror, either mounted on the vibrating body and partaking directly of its motion, or separately mounted and moved indirectly by means of magnetic influence under control of the vibrating body. In other cases, a beam of cathode rays is deflected by passing through a magnetic or electric field, the strength of which is varying in accordance with the sound vibrations.

As an example of the work of an electromagnetic curve drawing device, an oscillographic record of a complex sound is shown in Fig. 48. Another oscillogram of a much more complex sound is shown in Fig. 49. The sound in this case was that of the voice in uttering the word "poor."

The lower record of this figure is that of a simple wave at a frequency of 500 cycles per second. The records of this figure have the same horizontal scale, so that the lower one may be used as a guide to determine the frequencies of the upper.

Even with the great sensitiveness of these oscillographic wave tracers, many of the upper harmonics of complex sounds such as those of the voice, are lost and, for more complete analysis, methods of still greater refinement are required. These methods employ what are called "harmonic resonators" or "frequency analyzers."

They determine directly what frequencies are present in the complex sound, instead of first drawing the curve of the sound wave and then analyzing the curve for its component frequencies. In order to understand these direct methods of sound analysis, brief reference must be made to the principles of forced and resonant vibration.



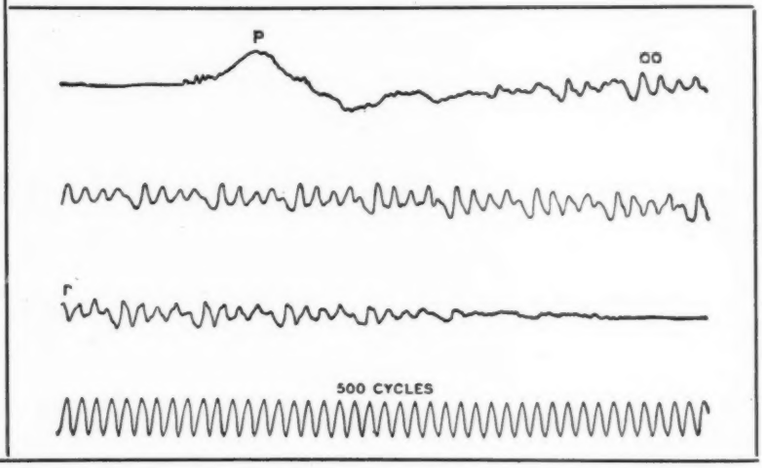


Fig. 48. Electromagnetic Curve-Drawing Device Showing How An Oscillographic Record of a Complex Sound Is Made—Fig. 49. Oscillogram of a Complex Sound, That of the Word "Poor."

As a general principle, it may be stated that any free vibratory body will have its own natural rate of vibration. Such a body, however, will be set in vibration by *any* periodic force applied to it, whether the frequency of the periodic force coincides with this natural rate or not.

When the frequency of the periodic force differs from the natural rate of the body, the vibrations thus produced are called *forced vibrations.* The amplitude of the vibrations will increase as the frequency of the applied force approaches more nearly to the natural rate of the body, and will be a maximum when the frequency of the force exactly coincides with the natural rate of the body.

The body will then be in *resonant vibration,* a limiting example of forced vibration. Under conditions of resonance, the increase in amplitude of vibration is most pronounced. Indeed, if there were no dissipation of energy, through friction or otherwise, the resonant vibration would increase indefinitely with the continued application of the periodic force.

We are all familiar with the fact that a piano string will be thrown into vibration by a nearby sound having a frequency of vibration corresponding to the natural frequency of the string. One tuning fork can be set in vibration by another of exactly the same pitch vibrating near by. These are resonance phenomena.

A striking example of a heavy body being kept in pronounced vibration by the application of minute periodic forces, applied at just the right intervals, is found in a long-pendulum clock. The pendulum, weighing perhaps several pounds, is sustained in vibration by the feeble impulses it receives from the clock escapement, because, and only because, the frequency at which these occur is exactly that of the natural frequency of the pendulum.

In the case of the tuning forks, the communication between the two is through air; the sounding fork causes waves in the air and these waves act, like the well-timed impulses of the clock escapement, to cause a cumulative vibratory effect on the second fork.

Masses of air, partially confined, have a natural rate of vibration. This may be shown by holding a vibrating tuning fork over a tall glass jar into which water is gradually being poured. As the water level rises, the air column in the jar above

it becomes shorter and its natural rate of vibration is changed accordingly.

When this natural rate is thus brought into coincidence with that of the tuning fork, the resulting sound will swell forth loudly. As will be shown in a subsequent chapter, this resonance of air masses forms an important phase of the production and modulation of sounds by the human organs of speech. It has also played an important part in the analysis of sound.

Reverting to the direct methods of sound analysis, Helmholtz, in his pioneer investigations of the character of complex sounds, used a series of air "resonators." Each resonator consisted of a globe of thin brass with a large hole at one side for the reception of the sound and small hole and nipple at the other side for application to the listener's ear. Each resonator was of such size and form as to give a particular natural rate of vibration to the air within it—it was tuned to a desired frequency.

If the complex sound under investigation had that frequency as one of its constituent harmonics, that tone would be greatly augmented in the resonator. By using a series of resonators, tuned respectively to a series of harmonic frequencies, the presence or absence of any one of these frequencies in a complex tone could be determined by listening for it through the corresponding resonator.

Most frequency analyzers up to a recent date have been based on this principle, involving the resonance of a body of air, but recently a more accurate method, involving the resonance of tuned electrical circuits, has largely supplanted it.

The principles of these electrical frequency analyzers will be better understood after the subject of tuned electrical circuits has been discussed. For the present purposes, however, it is sufficient to say that they consist in effect of a large number of "electrical filters," each so adjusted as to permit currents of only a single frequency, or of a very narrow band of frequencies, to pass, all other frequencies being almost entirely suppressed.

Since these filters are effective only on electric waves and not on sound waves, it becomes necessary first to convert the sound waves into corresponding electric waves and then to analyze these by means of the filters. By a suitable telephone transmitter, the complex sound under analysis is made to generate alternating currents which contain all the frequencies of its component simple tones, all with their proper relative amplitude.

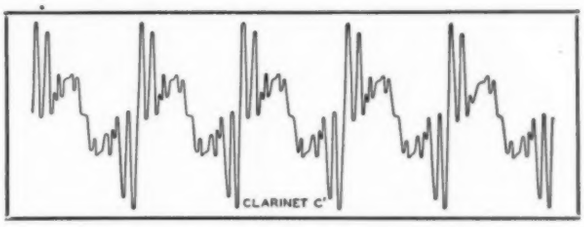


Fig. 51. Wave Form of Tone of Fig. 50.

By successively applying these filters throughout the entire range of frequencies being studied, the presence of each frequency in a sound may be determined and its relative intensity measured. The results thus determined, showing the component tones of a given complex sound may be graphically represented as in Fig. 50.

In this, the presence of each component of the sound is indicated by one of the vertical lines. The position of each line with respect to the horizontal scale indicates the frequency; and the length, as shown on the vertical scale, the amplitude. Thus we have what may be called a spectrum of the complex sound, the one in this case being that of the tone of the clarinet at a pitch corresponding to a frequency of 256 cycles per second.

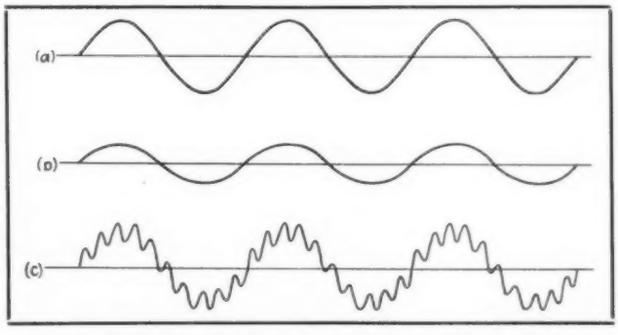


Fig. 52. Different Wave Forms and Amplitudes of Sound Having the Same Pitch.

This method of sound analysis by determining what frequencies are present and their respective amplitudes, gives directly and without resorting to curves, the most important information that is required in telephony. It does not give the phase relations of the various components, but, as will be shown, this is comparatively unimportant for telephone purposes.

If, for any reason, it is desired to draw an actual curve of the wave form, this may be done by combining graphically the simple harmonic curves representing each frequency as already described, it being necessary only to assume the phase relations. Such a curve thus drawn from the data contained in Fig. 50 is shown in Fig. 51.

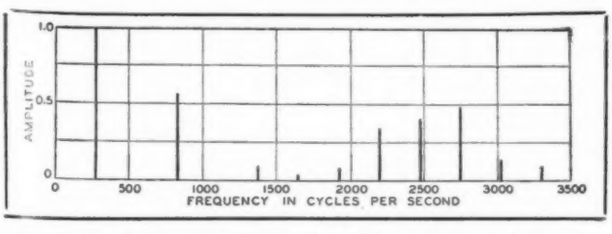


Fig. 50. Component Tones of a Given Complex Sound.

With the understanding, so far attained, of the nature of sound vibrations, we may now study the characteristics of sound by which our sense of hearing enables us to distinguish them from each other. As stated in the earlier part of this chapter, there are three such characteristics and three only—*pitch, loudness* and *quality*. Quality is often called *timbre* or *tone color*.

Pitch is that characteristic by which we distinguish so-called high notes from low notes. More particularly, it is the characteristic which determines the position of the tone on the musical scale.

Pitch is solely a function of the frequency of vibration. In a simple tone it is determined by the frequency of the single simple wave. In a complex tone, with exceptions that will be mentioned, pitch is determined by the frequency of the fundamental component wave.

Vibrations of lower frequencies produce the so-called "low" tones; those of high frequency, the "high" tones; hence it is that the low notes on a piano are produced by long strings of relatively great mass which vibrate slowly, while the high notes are produced by short strings of small mass so stretched as to vibrate rapidly.

Since frequency alone determines pitch, it is easy to see that the pitch of all the tones indicated in Fig. 52 would be the same, in spite of their different forms and amplitudes. All three have frequencies of 256 cycles per second. The upper and middle curves represent simple tones, with widely different amplitudes. The lower one is of a complex tone having a harmonic of ten times the fundamental frequency compounded with the fundamental. In spite of these differences, one's sense of hearing would tell us, without question, that they were all of the same pitch.

In the case of a complex tone, it has always been thought that the pitch was determined by the frequency of the fundamental component of the tone. Recent work by Dr. Harvey Fletcher and his associates in the Bell Telephone Laboratories has shown, however, that the fundamental and several of the lower harmonics may be eliminated from a complex tone without changing its pitch.[4] This is somewhat revolutionary, and disturbs the hitherto accepted definition—that the pitch of a complex tone is that of its fundamental—since with the fundamental gone the pitch remains.

Evidently since the sound waves coming

[4] "The Physical Criterion for Determining the Pitch of a Musical Tone." Dr. Harvey Fletcher, Physical Review, March, 1924.

The District Meeting of the Nebraska Telephone Association at Norfolk Had an Attendance of 70 Telephone Workers.

to the ear from an external source contained no frequency as low as that of the fundamental of the tone heard, the ear mechanism itself, by some sort of subjective operation, must have introduced a tone corresponding to that frequency. The matter is, therefore, one of interpretation by the ear mechanism, and will be treated much more extensively in the next chapter which deals with sound from the standpoint of sensation rather than of physical sound waves *per se*.

For most practical purposes, at least, the old definition—that the pitch of a complex tone is that of its fundamental rate of vibration—may stand. So far as is known, it is true of every naturally produced complex tone.

It is only when man, either by intent or *by defective design of apparatus or system*, cuts off some of the frequencies that would naturally lite at the base of a harmonic series of vibrations, that the ear steps in and supplies the deficiency, with a resulting sense of pitch not in conformity with the generally accepted definition.

The pitch of sound plays an important part in telephony. For this reason and also because, with the advent of radio, the transmission of music is demanding more and more attention, it is desirable for the telephonist to be able to associate concrete musical tones with their corresponding frequencies, and to understand something of the way in which these tones and frequencies are related in the musical scale.

It is also well for him to be able to speak of these tones not only in terms of their frequencies, but in such other terms as are employed by musicians and physicists. *(To be continued.)*

[EDITOR'S NOTE: The illustrations, Figs. 48 to 51, inclusive, are reproduced through the courtesy of the Bell Telephone Laboratories, Inc., New York City.]

Two Successful District Meetings of Nebraska Association.

Secretary George M. Kloidy was successful in holding two meetings of association members and employes during the past month. One of these was held at Norfolk, where 70 were present, and the other at Holdrege, where more than 60 registered.

The meetings divided into two sections, one a school for operators and the other round table discussions of plant problems. These were led by experts from the larger companies in the state, and proved to be very interesting and instructive.

This is part of the practical work planned by Mr. Kloidy as a part of the work of the association, and he has been able to command all necessary assistance from the long line companies, which are vitally interested in better plants and better service on the smaller exchanges.

The Holdrege District Meeting of the Nebraska Telephone Association Proved Most Interesting to Operators and Plant Men.

Large District Meetings in Illinois

Discussions of the Selling of More Telephone Service Prove Popular—Transmission Design and Maintenance of Plants—209 People Gather in Two Meetings; 23 Towns Represented at Marseilles; 44 Towns Represented at Paxton Meeting

There is a proved formula for the successful operation of any public utility company:

1. Find new customers.
2. Find new uses beneficial to present customers.
3. Constantly improve the service.

Each of these three elements necessary for profitable operation of a telephone company were discussed in the last two district meetings of the Illinois Telephone Association at Marseilles and Paxton.

The programs presented at each of these two meetings were essentially of the same character, with the exception of the addition of five reels of motion pictures at Marseilles. Eighty-four people attended the Marseilles meeting, and 125 attended the Paxton gathering.

One of the newest subjects to be presented at the Illinois meetings this year is that of the "Transmission Design of Subscriber's Plant." John J. Boesenberg handled the discussion by the use of blackboard sketches, stereopticon slides and design data sheets.

O. P. T. Daenitz of the Illinois Commercial Telephone Co. spoke on "Sales Campaigns" by use of the employes as salesmen of additional telephone service.

Telephone companies throughout the country are at last beginning to realize and awaken to the fact that the sales department is a much-neglected department within their organization. Mr. Daenitz described the sales campaign carried on in Wisconsin in which, in order to create interest among the employes, a contest was inaugurated between three areas or sections of the state.

The objective of this campaign was any increase in revenue that might be obtained by the sale of equipment or service of any type on a monthly rental basis without introducing a prohibitive expenditure for installation or obtaining that revenue. This, of course, excluded revenue obtained from the sales of advertisements in directories or revenues accruing from tolls.

The employes handled all sales. The employe having the highest individual score in each district received $25 in gold and for second highest score in each district $10 in gold. The third highest score in each district received $5 in gold. All employes making sales which amounted to 10 quota points were compensated at the rate of $1 for each 10 points.

Mr. Daenitz made use of many exhibits illustrating the method of carrying on the two weeks' campaign. He emphasized the fact that the ultimate success of any campaign depends in a great measure upon the amount and type of ammunition furnished to the contestants to aid them in obtaining new business.

To this end, Mr. Daenitz's company conducted an advertising campaign of one month's duration in 54 newspapers. Appropriate stuffers or inserts were enclosed with the regular monthly bills to customers. The employes were furnished with "sales prospect cards," which were filled out by the employe and then sent in to the general campaign headquarters in order that the prospects might be sent suitable sales letters and literature.

Eleven hundred and sixty-two new stations were added during the campaign in 73 exchange areas, or an average of about 16 new stations per exchange. The cost of the campaign was remarkably low, being but 5 per cent of the total of the new revenue obtained.

Group Picture of 125 Delegates at Paxton District Meeting of the Illinois Telephone Association. The Fine Building at the Left in the Background Is the Exchange. Many Visitors from Outside of Illinois Were Present Including Secretary-Treasurer Wm. H. Beck of the Indiana Telephone Association and R. C. Rottger, Both of Indianapolis, Ind.

Other speakers appearing on the program of the plant and commercial men's meeting were Louis Pitcher, president of the Illinois association; A. R. Workman, general manager, Marseilles Telephone Co.; R. M. Quick, manager of the Paxton exchange of the Illinois Commercial Telephone Co.; A. J. Parsons, secretary-treasurer of the Illinois association, and T. De Witt Talmage, transmission engineer of the Illinois association. A variety of topics of practical every-day interest was presented in their addresses.

At the Marseilles meeting these reels of moving pictures were shown at the conclusion of the conferences: "Digging in for Service," "A Name Makes the Rounds," "The Honor of the Job," "Prophecy Fulfilled," and "Electrical Transmission of Speech."

At Paxton Mayor Sam Ludlow and G. J. Johnson, state representative from the 26th Illinois district, gave short addresses at the noon luncheon with the Kiwanis Club held in the Methodist Episcopal Church.

Forty operators attended the traffic school at the Marseilles meeting. Each operator was asked to write a question on a slip of paper, and the first two questions drawn from a box received a prize. Twenty-three questions were asked in this manner. Three questions pertained to local practice and 20 pertained to toll practice. First prize was won by Miss Florence Spencer, toll operator, Streator, and second prize was won by Mrs. Iva Bottom, night operator, Marseilles.

Sixty-two operators attended the Paxton district meeting. First prize in the question box was won by Miss Pearl O'Donnell, secretary to the superintendent, Tuscola, Ill., and second prize was won by Mrs. Gladys Johnson, night operator, Paxton.

Frank V. Newman, general commercial superintendent of the Illinois Commercial Telephone Co., who has a host of friends in Illinois, was prevented from attending the Paxton meeting because of an automobile accident. When this fact was announced at the joint session, a motion was made and seconded that a telegram be sent Mr. Newman at Madison, Wis., expressing the unanimous sympathy of those attending the meeting and the hope that his recovery would be rapid.

The next district meeting of the Illinois association is scheduled at Galesburg on Tuesday, June 24. This meeting is in the center of the most thickly settled area of central Illinois and will, no doubt, be the largest attended district meeting this year. Other district meetings are scheduled for July 16 at Litchfield, July 30 at Rockford and September 17 at Streator.

Here and There in Telephone Work

Operator Calls Fire Help; Saves Switchboard and Records.

A fire in Camargo, Ill., April 5, wiped out the telephone exchange of the Illinois Commercial Telephone Co. and eight other business structures comprising the major portion of the business section of the town. At one time 25 buildings were afire.

Many say that only the bravery of the operator who remained at the switchboard as the flames leaped about her, prevented the entire town from being ravaged by the merciless blaze.

As the fire swept over the grass from the site of the grain elevator in which the blaze started, a strong south wind fanned the flames which soon began to engulf the home of Mrs. Laura Cox in which the telephone exchange was situated. Mrs. Cox and her daughter, Blanche, remained at the switchboard sending out calls to neighboring towns until sufficient outside help had been summoned. Camargo is a community of 500 persons and has no fire department or city water plant.

Mrs. Cox left her post—after the work was done—just before fire completely destroyed her home and the mass of telephone wires and equipment, throwing Camargo "off" from the outside world. She and her daughter lost all of their personal and household effects, escaping only with what they wore.

Asked concerning what she did, Mrs. Cox wrote TELEPHONY:

"I can only tell you this: After we had done all that we could do, we shut off the power and literally tore our board loose from the cable and got it out safe.

"Our pay station, too, we tore off the wall and saved—then I thought next of all our telephone supplies and records. I stayed by and saw the articles of furniture that held them carried to safety; then they wouldn't let me go back inside the house any more. I lost the electric ringer, and our rate book, but outside of that we saved our telephone equipment in good shape.

"In looking back over it, we couldn't have done any different. We served our community first. In moving into the new office, and in trying to establish our routine and make a home for myself and 18-year-old daughter, I realize with a surety, 'That it takes a heap of living in a house, to make it home.'"

Mrs. Laura Cox and Daughter in the New Telephone Exchange at Camargo, Ill. They Saved Switchboard and Records After Calling for Fire-Fighting Equipment from Nearby Towns, But Lost Their Own Personal Effects and Home.

Magneto Exchange Repairman; Ringing Equipment (Cont.).

By JOHN A. BRACKEN.

If mechanical trouble is experienced in the operation of the magneto exchange power-driven ringing generator, the first step is to look over all nuts and bolts and other parts to see that they are thoroughly tight. If nuts and bolts become loose, excessive strains occur which causes breakage of parts.

Cleanliness is an important factor in the proper operation of all electrical machinery. Extreme care should be exercised to see that the ringing generator is kept free from dust and dirt; otherwise it will soon develop faults.

The machine must also be kept free of dampness or moisture, for it will become more or less grounded. A ringing generator is said to be grounded when any part or parts of the electrical circuit is connected to the iron framework, and this will cause improper operation of the generator.

In locating the ringing generator, a very firm foundation should be provided so as to prevent vibration of the machine. If a machine is allowed to vibrate when in operation, it may cause the bearings to heat excessively.

A fault which sometimes occurs with a new belt-driven generator installation is due to the belt being stretched too tight and thus a bearing is worn out in a very short time. This occurrence may be prevented by having the belt slightly loose to start with and then gradually tightening it.

Mrs. Laura Cox and Daughter, Blanche, the Heroines of Recent Fire, in Front of New Exchange of Illinois Commercial Telephone Co. in Camargo, Ill.

Relative to heating of the bearings, they may under normal running condition of the machine become hot enough to burn the hand and still be at a safe temperature. The maximum allowable temperature is about 80 degrees Cent. or 176 degrees Fahr.

The ringing generator armature must rotate freely in its bearings; that is, that the bearings themselves are in good condition and that there is no mechanical obstruction to prevent proper rotation. Bearing trouble may be due to dirt, grit or not enough oil.

Modern ringing machines are usually fitted with brass lubricating rings that revolve with the armature and must pick up the necessary amount of oil for lubri-

cation of the armature shaft. This latter is very important. The oil used in the bearings should be the best grade of machine oil. If the oil used is too thick, it will not flow freely through the oil ducts in the bearings; and if too thin, it runs out too quickly and there is not a sufficient layer of oil between the shaft and bearings.

The most frequent source of electrical trouble experienced with the power-driven ringing machine is due to defective brush contact at the current collector rings, resulting in sparking and improper ringing. The brush tension should always be correct, and the brushes watched to see that they are not allowed to wear too short. Before they are too much worn, they should be replaced by new ones. It is important to use brushes of the proper size and length.

To the many causes of sparking at the generator collector rings, although there is no fault in the generator armature, belong the unsuitable materials which are used for lubricating the collector rings.

It may be taken for granted that the ringing generator maker has designed the machine so that it works sparklessly with the brushes supplied. If, however, in spite of this, there is sparking, the use of some graphite compound will not alter the condition. If it is considered necessary to give the generator collector rings a polish, which is generally possible only with carbon brushes, it should be done only with a polish recommended by the manufacture of the ringing machine.

The generator collector rings should be frequently examined for surface defects. When the surface is even, smooth, polished and shows a shining deep bronze (sun tan) color, the collector rings are then in good working order; any other surface appearance would indicate defects requiring prompt investigation and remedy.

Other causes of sparking are due to inequality in distance of the brush holder from the collector rings on the two sides, to the brushes being out of alignment, to weak brush springs, or where the brush has become too short from wear to respond to the spring pressure.

In proper condition, the brushes should show a bright plumbago (black) appearance at their contact surfaces. When they are a dull black and scarred, some trouble has been created, as will be indicated by a bluish oxide or other discoloration on the collector ring. Carbon brushes that are too soft or too hard will often cause trouble. When a brush shows pitting on one side, there is a poor contact from a weak spring.

The ringing generator should be examined to see that no wires or other conductors touch any of the rotating parts and that none of them are disconnected or loose. Note that the proper voltage is actually available at the generator terminals; that is, that the voltage output corresponds to that stamped on the generator name plate.

Check for loose fuses, proper type protective lamps, and that all connections and contacts are properly made in the entire ringing circuit between the generator and switchboard. Checking these points first will frequently locate the cause of the developed fault outside of the ringing generator, thereby saving time which might be spent searching for it in the generator.

In the final analysis, efficient magneto exchange plant maintenance is based on knowledge. This requires the obtaining of accurate knowledge of the telephone plant—and then it's correct application.

As the result of years of experience, there are certain principles and methods of conducting the construction, operation and maintenance of a telephone plant which are universally recognized as necessary and essential to obtain the least number of service failures and the greatest number of satisfied subscribers.

Every stage in plant practices should be based upon definite knowledge of how it can be done through the introduction of scientific methods rightly applied.

(End of Series.)

SAFETY DOCTRINES
Think Before You Act!

By John A. Bracken

How many times do we hear telephone men say, "I never had an accident"? Most veterans who have been in plant and other telephone work for many years without an accident, know accidents happen every day.

No one expects to have an accident; every one hopes not to have one. The lineman who cut the last wire from the crossarm of a pole broken off or rotted in the ground and fell with it, did not think when he started in the morning that he would have an accident. Nevertheless, we can be careful and think clearly before we act.

Flags and Line Rods for Parallax Pole Line Staking.

By Lewis Smith,
Engineer, West Coast Telephone Co., Beaverton, Ore.

Staking telephone pole locations by the parallax method is made easier, quicker and more accurately by the use of properly-constructed flags and rods.

The ideal condition is obtained on a cool, sunny day where the two ends of the section to be staked are not greater than one-half mile apart and the intervening pole locations can be seen; where the sighting is "with the sun," the distant flag easily seen, the "sighting" rod small in diameter and easily imaged, and the line rod held vertical and of large enough diameter to be easily distinguished.

This ideal condition is seldom obtained. Visibility may be impaired by lack of light or by heat waves or by sighting "across the sun." The sections to be staked vary in length and are often undulated. We must, therefore, make our rods and flags as nearly ideal as possible.

A 10-foot, 1 inch by 3 inches in three sections and suitably pointed at the base makes a good flag if marked off in one-foot divisions, each division again divided lengthwise in halves which are painted orange and white, with the colors alternated.

A half-inch jointed brass rod seven feet long and marked off with six-inch bands alternated red and white makes a good "sighting" rod. It may be purchased for an economical sum, and is suitably pointed.

For a line rod, a one-inch brass rod four feet long, marked off with six-inch bands alternately red and white, may also be purchased. To improve it, jam some lead inside, near the point, and secure a cylindrical piece of wood that will fit snugly inside the top, and have a smooth ball turned on one end. This will give the rod greater weight at the bottom end, assuring a vertical position and accurate "drop," as well as a convenient and easily released handle.

At distances approaching one-half mile, a handkerchief may also be needed for locating this line rod, which has been found suitable for shorter distances.

Plan Telephone Service on Grand Trunk Railway Trains.

Introduction of passenger-train radio-telephony in the United States, whereby passengers en route would be enabled to maintain two-way telephone contact with telephones of the entire Bell system, including its international links, is proposed by the Grand Trunk Railway, a subsidiary of the Canadian National Railway, in plans presented to the Federal Radio Commission.

Dr. C. B. Jolliffe, chief engineer of the commission, stated orally that the plans had been discussed informally with him and members of the commission by J. C. Burkholder, radio engineer of the Canadian National. The Grand Trunk operates from Montreal to Chicago.

Mr. Burkholder, said Dr. Jolliffe, related that train telephony now is maintained by the Canadian National in Canada and is successful. Communication is through the Canadian Bell system. The project is to extend this service to the Grand Trunk Railway, the American subsidiary of the Canadian line, and provide similar train radio-telephone service for passengers from Montreal to Chicago.

Operators Discuss Training and Billing

Training of Operators in Small Exchanges—Value of Learning From Actual Experience—Accurate and Legible Entry of Billing Information by Toll Center Operators—Papers From Annual Traffic Conference of Iowa Association

The Training of New Operators.

By Mrs. Madge Wilson,

Chief Operator, Iowa United Telephone Co., Albia, Iowa

In selecting and training an operator it is quite essential to select a girl of a high-school education and one who is willing to attend to business before pleasure; one to be depended upon. A girl with too many social activities is not to be considered.

Next a girl's health is to be taken into consideration. If she is not strong, or has to be off duty a great deal on account of her health, that should be looked into before taken as an operator, because an operator's job is one that has to be continued 24 hours a day.

First, I think a student operator should be taken in hand by the chief operator or supervisor and the book of local instructions gone over thoroughly, the chief operator explaining each and every part of the equipment mentioned. Then when she is fully familiar with the equipment she is to work with, put her at the board, showing her how to adjust her headset, with transmitter close to her lips.

What we must do in order to train them is to show them. Let them learn from actual experience. You can tell a girl a hundred times how to do a thing, but one demonstration will accomplish better results than all of your one hundred lectures.

Next, show her how to hold her back plugs in each hand, resting her hands upon the keyshelf while waiting for a signal. Explain the multiples and location of the numbers, also the ringing keys. When all this is explained, have her answer a signal with "Number, please?" and acknowledge the number with "Thank you." See that she reaches the right number and ring.

If a student operator shows a willingness to learn and takes an interest in trying to find out how to give better service to subscribers, she will no doubt become a good operator. But an operator who has no confidence in herself and thinks she should be pitied because she is unable to learn as fast as another, will never make good as an operator. The girl with the "I can and I will" spirit is the one who will succeed.

Accuracy is the next step to be taken up. The supervisor should explain to the student operator the unpleasantness to the subscriber, who is called by mistake, and the waste of time to the calling party when the wrong number is reached. The student operator also must be taught to take her busy test; instructed as to what an error it is and how it irritates a subscriber to be rung in the ear. Then her voice must be trained, for in no other vocation does a pleasing and assuring voice mean so much as it does in the telephone business.

Next, she should be taught the importance of being courteous to subscribers; that she is the direct representative of the company and as much depends upon her courtesy as upon the service she renders.

Take up one thing at a time, going into it thoroughly. After the operator has become familiar with all other details, she will gain speed which is very essential to make a good operator.

Concentration is another very important step; more errors are caused by misunderstanding than any other cause.

All operators should receive instructions as to the general responsibilities and obligations of their position. They should also be warned against revealing any information they may overhear in the office. There are severe legal penalties.

Tributary Office Billing from Toll Center's Written Records.

By Marie Hanny,

District Traffic Supervisor, Northwestern Bell Telephone Co., Des Moines, Iowa

The value of long distance telephone service to the public depends to no small extent on the speed of connection. During the last five years the average time required for completing a long distance connection has been cut more than half by the development of operating methods which provide for completing the subscriber's call while he remains at the telephone. This remarkable improvement in speed has made long distance service more convenient to the customers using it and has, at the same time, developed the problem of further eliminating delays in handling long distance traffic.

The customer in placing a long distance call at a large office, waiting at the telephone only a few moments and then talking with the called party a number of miles away, quite naturally expects the same service when he places a call from a small office, which because of the arrangement of toll circuits happens to be a tributary.

To speed up the handling of tributary traffic, much has already been done by way of establishing direct contact between the long distance operator at the toll center and the subscriber of the tributary office. One of the requirements in connection with the toll center operator dealing directly with the subscriber at the tributary office is the need for accurate and legible records, which are used by the tributary for billing purposes.

Considering the ticket before any attempt at completion is made it is, of course, vitally important that the record be correct as to the calling subscriber's number, the person or telephone with whom he wishes to talk, and the name of the city or town in which the desired person or telephone is located. Starting out to complete a long distance call with any less information than this would be equivalent to starting out for a long drive over strange highways without a map. The result in both cases would be similar: considerable delay in arriving at the destination and in some cases coming back to the starting place for a new start.

In some instances other information, such as special instructions for reaching the calling or called telephone or person, knowledge that the call was placed at a pay station, or if charges are collect, are very vital requirements in the prompt completion of the call; and in all cases greater speed is possible when the number of the called telephone is furnished.

The responsibility for service of the call does not end until the charges are properly billed to the customer. When it is recognized that approximately 87 per cent of the business originating at tributaries in the state is handled at the toll centers, the toll center's responsibility in accurate and legible records and the tributary's responsibility in contributing her part in assisting the toll center to secure accurate information, are obvious.

For billing information, the legible and accurate entry on the ticket of (1) the name of the calling and called offices; (2) the calling telephone number; (3) the name of the calling or called person, if either or both are given by the subscriber placing the call; (4) proper entry of "COL" if the call is collect; (5) the classification of the call if person-to-person; (6) the correct conversation time, and (7) the correct rate, are essential.

The accurate and legible entry of these items on the ticket is not acquired without careful day-to-day supervision and great care on the part of operating forces.

With the human possibility of error, numbers are occasionally misunderstood, names are even more frequently misunderstood; and combining these with occasional cases of illegibility due to hasty or careless ticket entries by the toll operator, offer opportunity for ticket irregularities. On the other hand, when the operating force recognizes their responsibility not only for prompt and accurate completion of the call but also for an accurate and legible record

of it, comparatively few irregularities result.

With carefully-trained operating forces there is no necessity of the greater speed brought about by the toll-center operator dealing direct with the tributary subscriber to be offset in any way by a corresponding increase in ticket record irregularities.

Perhaps, if you represent a toll center, you are wondering just how to proceed with plans for improvement of the accuracy and legibility of tickets handled for tributaries; or if you represent a tributary, you may wonder what you might do to contribute to improvement?

The first consideration is responsibility. The toll center is, of course, responsible for making an accurate and legible record, and the tributary's responsibility is to render every assistance to the toll center in accomplishing this.

With recognition of responsibility, there must also be a mutual understanding at both the tributary and toll center, of conditions in the other office as well as a spirit of helpful and constructive cooperation on the part of both. These factors, coupled together with a well-trained operating force that has a desire to give good telephone service in its broadest scope, cannot help but meet the objectives of the telephone business: "The Most Service and the Best at the Least Possible Cost."

Personal Notes from the Field

William J. O'Connor, since September 1927, assistant vice-president of the American Telephone & Telegraph Co., New York, has been appointed assistant to the president of the A. T. & T. Co., succeeding J. D. Ellsworth who retires July 1.

The new assistant to the president of the A. T. & T. Co., became associated with the Bell system on July 1, 1917, when he

William J. O'Connor, New Assistant to President of American Telephone & Telegraph Co., Has Been Associated With the Bell System for 13 Years and Prior to That Was in Newspaper Work.

joined the Southwestern Bell Telephone Co. as publicity representative at St. Louis, Mo. He was absent on military leave from September to December, 1918, when he resumed his duties as publicity manager.

On January 1, 1919, he was appointed general publicity manager of the Southwestern company and in September of the same year was made assistant to the president of that company. On April 1, 1926, Mr. O'Connor became vice-president of the Southwestern company, which position he held when transferred to the A. T. & T. Co. on September 15, 1927.

As assistant to the president and later as vice-president of the Southwestern Bell company Mr. O'Connor handled both personnel and advertising problems. The company insurance and savings plans both had their inception on his staff, although neither had matured when he was called to New York by the American company.

Before going to the Southwestern company, Mr. O'Connor was in newspaper work. He held various editorial positions on the St. Louis Times and Globe-Democrat and finally became a writer on the St. Louis Post-Dispatch, where he earned reputation for remarkable ability.

J. L. Elliott, traffic and equipment supervisor of the South Coast district of Associated Telephone Co., Ltd., Los Angeles, Calif., was a visitor in Chicago during the first week in June. Mr. Elliott's visit was primarily for the purpose of conferring with the engineering staff of Automatic Electric Inc. in connection with plans for the installation of a large amount of dial telephone equipment for the new Long Beach main office.

Due to Mr. Elliott's long familiarity with various units of the Long Beach exchange, it was considered wise for him to make a trip to Chicago so that he could deal directly with the engineering staff of Automatic Electric Inc. rather than attempt to handle the matter through the medium of correspondence.

While the large growth in population in Long Beach during recent years has taxed the capacity of the operating company to the utmost, the meeting of service demands has proceeded in a very satisfactory way. The company's new Termino office recently installed with an initial capacity of 1,000 lines will, it is estimated, be expanded to 5,000 lines by the end of the year.

Obituary.

Frank M. Hageman, general manager of the Southwest Telephone Co. with headquarters in Pratt, Kans., died May 30, after an illness of six weeks. He was an old-timer as far as the telephone industry was concerned, having been a telephone man for over a quarter of a century, about 20 years of which were spent in Pratt. He was a young man in years as he was only 50 years old. He was born in Kentland, Ind., July 9, 1879.

Mr. Hageman was plant superintendent of the Pratt Telephone Co. at Pratt for a number of years. In December, 1921, following the death of C. A. Sloan, owner and manager of the company, he became manager. Several months ago when the Southwest Telephone Co. was organized to take over a number of exchanges in southwest Kansas, Mr. Hageman was made general manager of the new company.

Louis G. Richardson, until his retirement six years ago a prominent figure in the telephone world, died on June 6 at his home in Evanston, Ill., after an illness of several years.

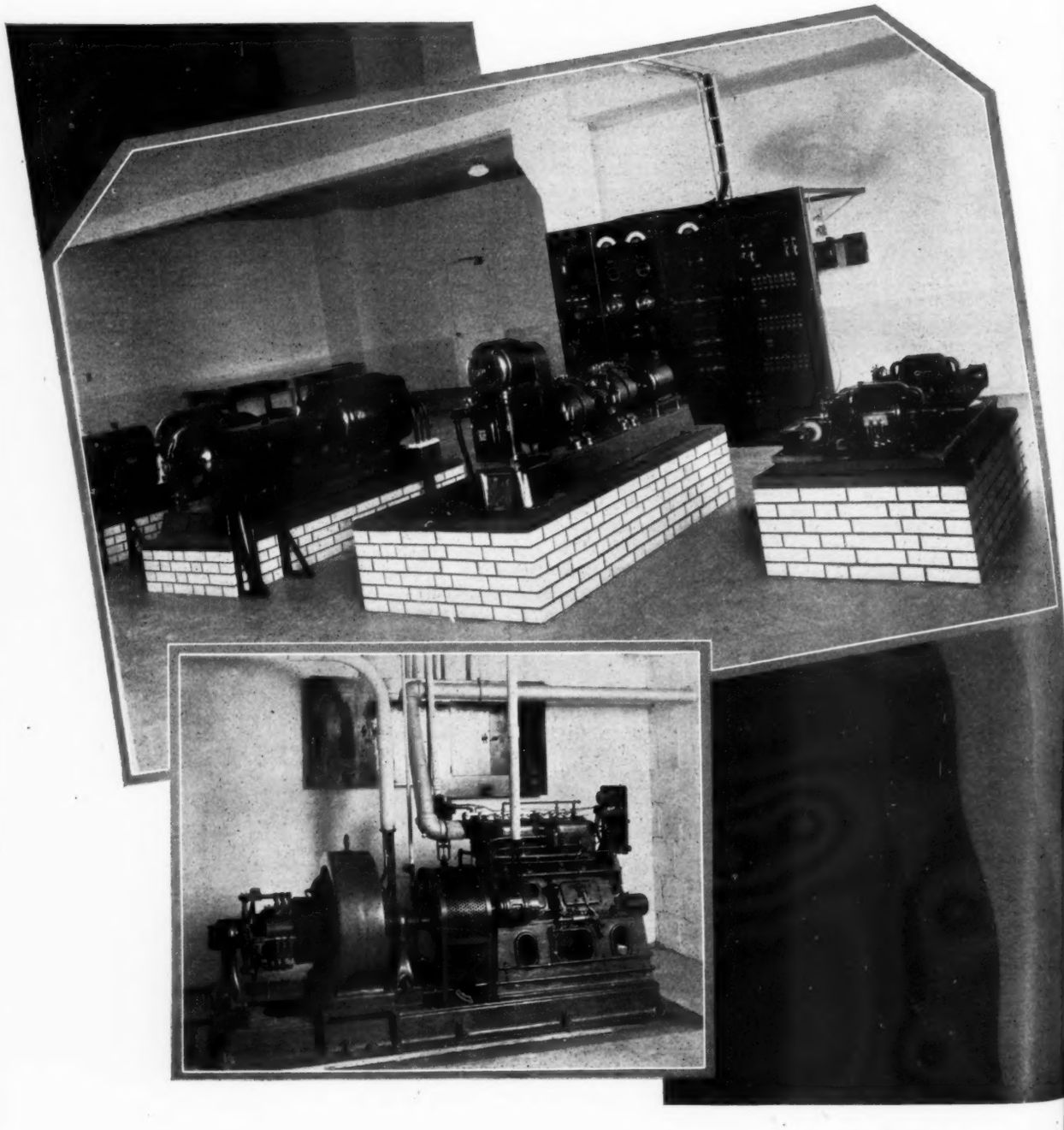
He was president of the Central Union Telephone Co., which included Illinois, Indiana and Ohio, from 1903 until 1911. From 1911 until 1924, when he retired, he was general counsel for the former Chicago Telephone Co.

Mr. Richardson, while in Toledo in the late '90s, became connected with the legal department of the American Telephone & Telegraph Co. and moved to Chicago in 1900. Soon afterward he was transferred to the operating department and shortly after was made president of the Central Union company. Under his direction the general headquarters of the company were established in Indianapolis and a large building constructed there.

Mr. Richardson was born in Cambridge, Mass., 70 years ago. He was a member of the Loyal Legion, the Union League Club and the Sons of the American Revolution. He is survived by his widow, Mrs. Jessie S. Richardson, and two daughters.

Edwin Pembleton, prominent business man of Clayton, Ind., fell dead at his home recently. He settled in Clayton last fall and bought the Clayton Telephone Co. having exchanges in Clayton, Hazelwood and Stilesville, and was reorganizing it under the name of the Hendricks County Telephone Co. Mr. Pembleton formerly had charge of a telephone plant at Prairie, Du Sac and Sauk City, Wis. Previously to entering into the telephone business, he practiced medicine in Wisconsin. He is survivd by the widow and a son.

Power Supply—Symbol



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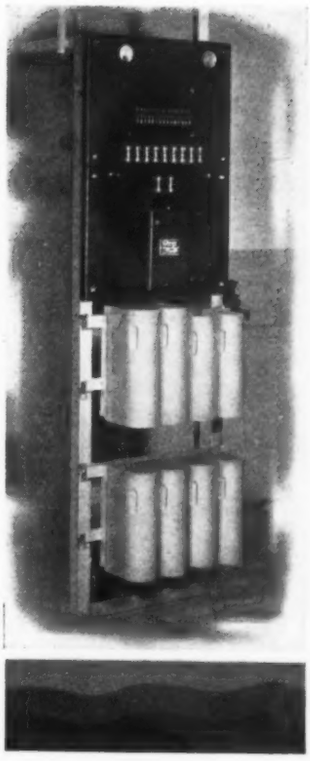

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AUTOMATIC SYSTEMS

Fine Telephone Service for Palmyra, Mo.

Western Telephone Corp. of Missouri Installs New Improved Switchboard and Rebuilds Outside Plant at Palmyra, in Keeping With the Town's Progressiveness — Some Features of the Rebuilt Exchange and Equipment

By E. R. Sears,
State Representative, Kellogg Switchboard & Supply Co., Chicago

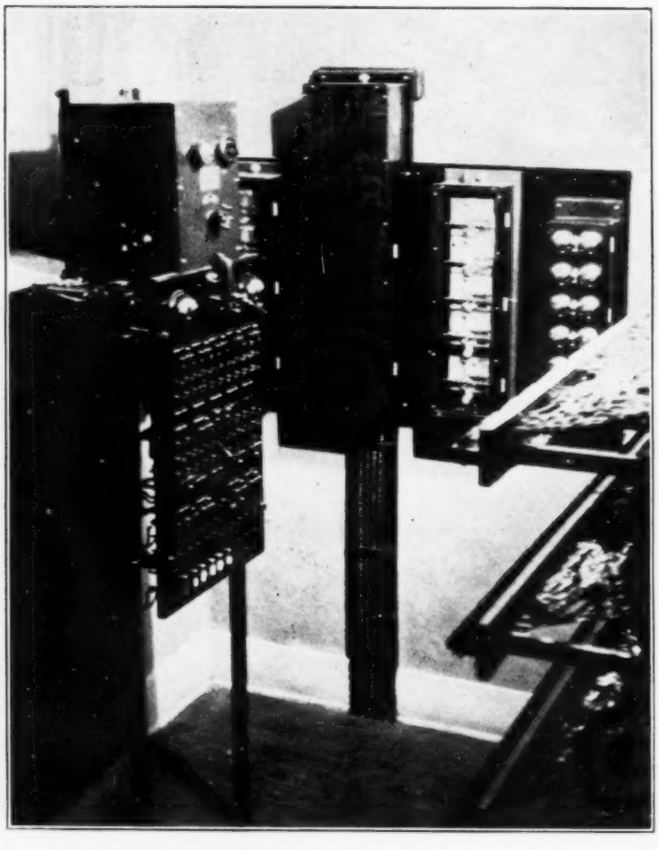
In reading about the town of Palmyra, Mo., one would believe it to be much larger in population than 2,800 persons. The story of Palmyra is a story of real progressiveness.

This active town has practically every modern city convenience. It is the county seat of Marion county, and so located as to contain the junctions for several federal and state concrete highways. It is the hub of the finest system of county hard-surfaced roads in northeast Missouri. All of these roads are under the supervision of a patrol system. The C. B. & Q. main railway lines from Chicago and St. Louis to Denver have established a junction in this town, and it has a fine new modernly-equipped railroad station.

The streets of Palmyra are paved with either concrete or macadam. The municipality owns and operates a very fine light and filtered water plant, sewer system with modern disposal plant, and an efficient fire department that is equipped with the latest fire-fighting devices. At night Palmyra looks like a "Great White Way," for it is adequately lighted in the residential section, as well as the entire business section.

In the town will be found a large municipal building, a splendid courthouse, and many business buildings fashioned after the most modern types. Its buildings are all well kept. Aside from its business section, it is known as a city of beautiful homes. Its schools rank with the best of the state and are attended by scholars that come from miles and miles. The school system is composed of public grade and high schools, and also a public school for colored children. There are established two private schools and ten churches of the leading denominations—all with beautiful buildings.

The county owns and operates one of the two modern hospitals located in Palmyra. Though small in size, the town supports two banks housed in handsome new banking buildings whose total resources reach nearly two million dollars. A prosperous building and loan association has



Power Board, Charging Equipment and Kellogg Pole-Changers—Partial View of Area of Switchboard and Part of Main Frame; Note Relay Gate of Swithboard. Telephone Building in Palmyra, Mo., Is Shown in the Upper View.

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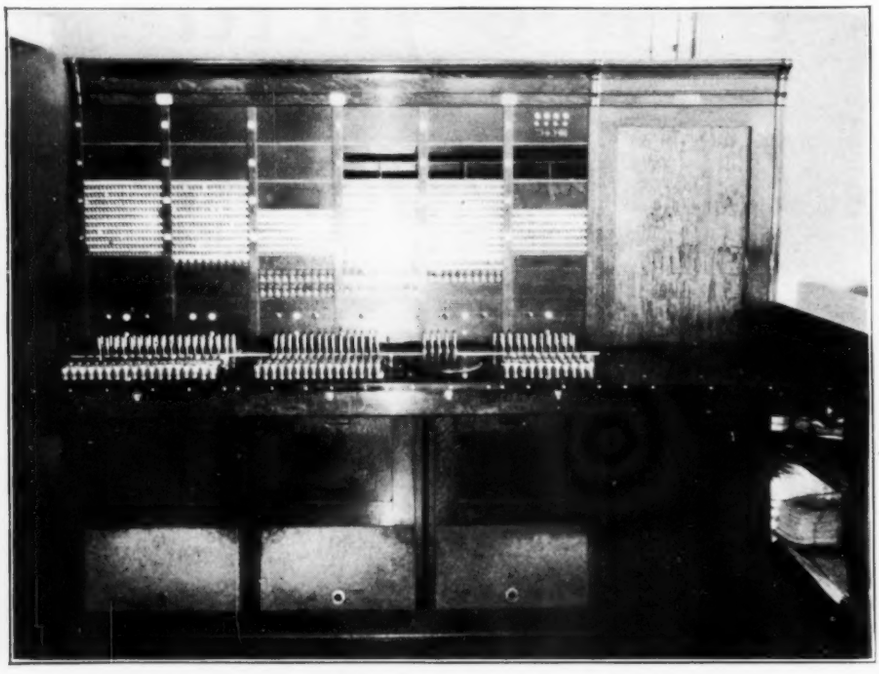
been operating successfully for many years.

Marion county is one of the leaders in agricultural and live stock production in the state, and has an assessed value of $29,000,000.00. It was one of the first counties to adopt the farm agent idea, and established offices in Palmyra. The county health department offices are also in Palmyra.

The county has a population of approximately 30,000, supported by a number of smaller villages, scattered around Palmyra. Palmyra is near the geographical center of the county. There are more automobiles in Marion county than in any other county in this section of the state, and it is one of the wealthiest agricultural counties in Missouri.



Local and Toll Kellogg Service Switchboard of the Palmyra Telephone Co., Palmyra, Mo.

The town of Palmyra is known to have the best live-stock market in northeast Missouri. There are several large buyers of creamery, poultry and eggs that make large shipments regularly, besides two cooperative and two private shippers of live stock and feed.

Palmyra supports manufacturers and distributors of ice cream, bread, printing and stationery supplies, artificial ice, machine parts, jewelry, lumber and coal, and a local telephone company, whose lines serve the entire county.

As the town progressed and prospered, the telephone company had to increase and better its service. Back in 1895, the Palmyra telephone exchange was first put into operation. It was built and owned by J. T. Sutter and his brother-in-law, Ben Moss of Monroe City. Later Mr. Butler purchased the entire interest in the plant, and operated it until ten years after it was first constructed. At the end of that time, it passed into the hands of various individuals.

About 20 years ago, F. T. Staton went to Palmyra to manage the plant. Mr. Staton purchased the properties at a later date, and continued to operate the exchange until April 1, 1927. E. C. Hunt was the new purchaser. At the same time he was operating a number of exchanges in Nebraska.

The Central West Missouri Telephone Co. came upon the scene and purchased the property from Mr. Hunt three months later. The Central West Missouri Telephone Co. has been operating the Palmyra exchange since July, 1927, and within this last year changed the company name to the Western Telephone Corp. of Missouri, with headquarters at Salina, Kans.

When the Western Telephone Corp. of Missouri first acquired the property at Palmyra, the central office was located above a store building and was rendering service over a magneto switchboard many years old. In keeping with its policy of having its central offices convenient to the public and with its plan to improve the service, the corporation purchased a building in the center of the business district.

Herbert J. Clark of Salina, Kans., general manager of the Western Telephone Corp., of Missouri, realized that it was necessary to improve the telephone service at the Palmyra exchange. To meet the rapidly-increasing business and growth of the town, plans were accordingly laid for common battery telephone service, and rebuilding of the entire outside plant was commenced.

Mr. Clark discussed with the subscribers the new service that his company proposed rendering and his work resulted in the subscribers at the Palmyra exchange agreeing to pay the additional rate necessary for the improved common battery service. The telephone company then applied for and was granted an increase in its rates.

Mr. Clark's policy is to give telephone subscribers the best in telephone service, and naturally it was necessary to install modern equipment. An order was placed with the Kellogg Switchboard & Supply Co. for a new service switchboard and common battery telephones.

Work was immediately started on recabling the entire outside plant. The telephone layout of the town has practically been rebuilt. About five miles of underground cable have been laid, doing away with most of the overhead telephone wires in the business district, and a large amount of aerial cable was placed throughout the residential district. The outside cable plant and construction work was planned and engineered by Endsley Jones, general superintendent and plant engineer for the Western Telephone Corp., with headquarters at Salina, Kans.

The operation of the Palmyra exchange is under the supervision of F. M. Browne with headquarters at Clarence, Mo. Mr. Brown is the operating head of all of this company's holdings in Missouri. Direct supervision of construction work at Palmyra was under Frank Foote, who has charge of all new telephone construction work in Missouri for the company. Through the untiring efforts of E. E. Burke, local manager at Palmyra, and the other local employes, the Palmyra exchange was successfully converted from magneto to the common battery service. The cut-over was formally announced in June, 1929.

The new Kellogg service switchboard consists of a three-position, six-panel section, and a cable-turning section. It has a capacity for 1,200 common battery line circuits and is wired and equipped with 500 local subscriber lines, 40 rural lines, and 10 toll lines.

The local lines terminate on line lamps which are of the associated line-lamp type and arranged throughout the switchboard on a three-panel basis. This gives two complete appearances of the line and lamp jacks, and makes all lines available to any operator on the switchboard. This arrangement enables the operators to handle heavy traffic with efficiency, as the local calls are evenly-distributed throughout the board.

The rural lines and toll lines terminate on combined drops and jacks conveniently located in the switchboard for giving fast service. Ten recording trunks are also provided for passing calls for toll to the toll operator. All of the cord circuits are of the full universal type, which makes it possible for each operator on the switchboard to handle any class of call.

Each cord circuit is equipped with an individual five-frequency ringing key, which permits the operators to give prompt service to the subscribers. When the operator depresses her ringing key button

(*Please turn to page* 39.)

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What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Approval Given Division of Territory in Pennsylvania.

Approval of the proposed interchange of properties by the Bell Telephone Co. of Pa. and the Cumberland Valley Telephone Co. in the central Pennsylvania district radiating around Harrisburg was given late last month by the Pennsylvania Public Service Commission.

Under the terms of the agreement the Bell company for a consideration of $1,218,000 will sell to the Cumberland Valley company its physical and tangible property, except for certain toll lines, in Adams, Franklin, Juniata and Perry counties, and parts of Cumberland and York counties.

The Cumberland Valley company for a consideration of $976,135 will sell to the Bell company its properties located outside of those districts with the exception of its main office building in Harrisburg. Each company will discontinue exchange service in the field taken over by the other, and agreements will be made for the interchange of toll business, it was stated.

In payment of the difference between the purchase prices of the respective properties, the Cumberland company will deliver 3,750 shares of its common stock, valued at $154,700, and 2,690 shares of its preferred stock, valued at $269,000, to the Bell company, according to the order.

In the territory to be transferred to the Cumberland company, the order said, the Bell company has 10,705 stations and in the same territory the Cumberland company has 7,795 stations, of which 1,148 are duplicates. In the territory the Bell company is taking over from the Cumberland company, the Bell has 32,798 and the Cumberland 4,571 stations, 1,580 of which are duplications.

The estimated cost to the Cumberland company of unifying and rehabilitating the property will be $260,000 and to the Bell company $229,350, it was stated.

"In order to conform to the classification of exchanges adopted and forming the basis of the tariff schedules of Bell company," the order said, "various changes in the existing rates of both Bell and Cumberland companies, in the territory involved, are contemplated after the unification, including reduction of local service areas, reduction or no change to subscribers in majority of the local exchanges and in some places an increase of rates due to the number of stations added to the exchange.

"The applicant companies claim and contend that the proposed unification by eliminating existing duplication of facilities providing connection for interchange of traffic of the two systems and their connecting companies and removing uneconomic competition would improve the service and result in economies beneficial to the public. The benefits and advantages which have followed similar unification of telephone systems heretofore approved by the commission substantiate this claim."

Ohio Company Ordered to Refund For Increased Rates.

The Marion County Telephone Co., Marion, Ohio, and its successor the Ohio Associated Telephone Co., has been ordered by the Ohio Public Utilities Commission to refund $162,000 to subscribers for excess rates charged when the rates were advanced under the provisions of the Pence law, which has since been repealed by the Ohio legislature.

The rate schedule was filed August 1, 1925, and a bond was posted to cover the refund in case the advanced rates were not approved by the commission. Of the sum to be refunded, $112,000 was collected between August 1, 1925, and December 21, 1928, and $50,000 since the latter date. As all subscribers were not affected by the rate increase, the refunds will be paid only to those who were affected.

A statement by the commission concerning the order said that various hearings have been held for the valuation of the property and the former commission fixed, under the date of December 15, 1928, $1,179,557.24 as the value of the property used and useful as of May 1, 1925.

The present commission, considering this fixed value, has since been considering the revenue received by the company, the expense of operation and the reasonableness of the rates. The present commission has considered that a net return of 7 per cent to the company upon value of the property would be just both to the company and to the subscriber.

The commission, in considering the important item of expense allowed for depreciation has taken into consideration the history and experience of the company and the law in regard to the same, as well as the uniform system of accounts prescribed for telephone companies.

At the time of the former reorganization of the present company, a depreciation reserve of $227,913.13 was dropped in 1923 and $92,047.66 in 1927. From the value of the property carried on the company's books and the amount set aside for accrued depreciation, the record shows that the actual depreciation was not over 1.86 per cent per year and that the depreciation expense as shown by the books was not over 5.13 per cent, with a maintenance expense of 4.49 per cent.

The commission was required to decide what rate would be necessary in charging a depreciation expense for rate making purposes in order to create an adequate reserve. Considering all the matters before the commission, it is determined that 3.61 per cent applied to the appraised valuation of the property is a fair measure of depreciation.

The commission finds that the rates provided by the company's rate schedule are excessive and orders that the schedule filed by the company and made effective August 1, 1925, be disapproved.

The commission orders that the company immediately prepare and submit to it a revised schedule which will produce a lesser amount of revenue of at least $112,000 during the period from August 1, 1925, to December 31, 1928; that the schedule shall be made retroactively effective as of August 1, 1925, in lieu of the proposed increased rates now being collected; that the company shall, effective April 1, 1930, carry on with diligence the determination of what amounts have been collected from each subscriber from August 1, 1925, to the date of acceptance of the revised schedule.

The commission specifies that such computation of excess charges to each subscriber shall be completed within a period of six months and that refund in cash of such excess charge, plus interest at 6 per cent, be made to each subscriber by the end of the six months' period; that any refund due any subscriber on account of the excess collections which shall not be paid to the subscriber on account of inability to locate him, shall at the expiration of one year be paid to the treasurer of the county or other political subdivision in which such revised rate schedules were effective under bond, for the benefit of the general fund.

The company is ordered to preserve and keep intact all books disclosing its collection within the period aforesaid; the determination of the various amounts and payment of all refunds shall be subject to the supervision and auditing of the engineers and accountants of the commission, and the company make written reports at monthly intervals to the commission.

The $112,000 ordered to be refunded is for the period ending December 31, 1928. About $50,000 in addition thereto, which cannot be now accurately calculated, will

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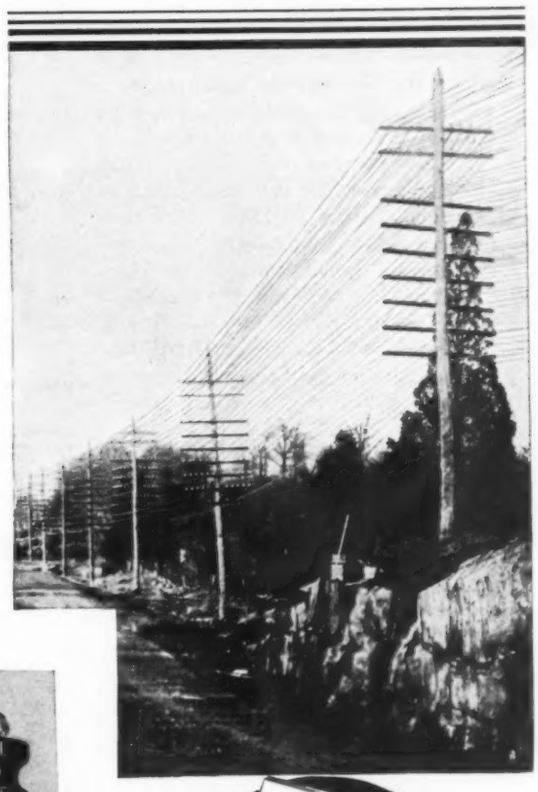

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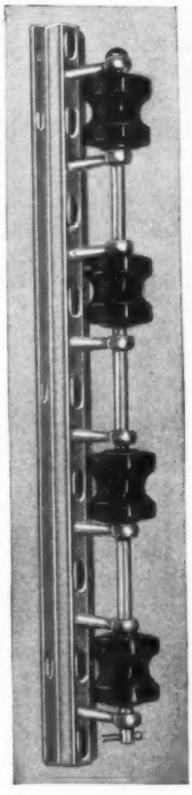

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be refunded for the period subsequent to December 31, 1928.

A rehearing will be sought by the Ohio Associated Telephone Co., counsel for the company stated. Should the rehearing be denied, he said, an appeal will be made to the state supreme court.

Ohio Commission Fixes Low Valuation for Circleville Exchange.

The Ohio Public Utilities Commission has fixed the valuation of the property of the Citizens Telephone Co., of Circleville, in its application for increased rates at $374,620.28. This is $90,754.46 lower than the tentative valuation fixed and $258,313.67 lower than the value claimed by the company. The tentative value of $465,374.74 was fixed by the former utilities commission. The city of Circleville protested that the valuation was too high and the company protested that it was too low.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

June 24: Hearing at Washington, D. C., on the joint application of the New York Telephone Co. and the Greenville Telephone Association for authority by the New York company to acquire the properties of the Greenville association, which serves approximately 395 stations. There are no telephone stations of the New York company or any other company in service in the territory served by the Greenville association, with the exception of a few stations on independently-owned grounded circuits without outside toll connections. The Greenville Telephone Association is an unincorporated mutual telephone association and owns and operates a telephone system in portions of Rensselaerville, Westerlo, Cairo, Coxsackie, Durham, and Greenville in New York.

June 24: Hearing at Washington, D. C., in the matter of the joint application of the Bell Telephone Co. of Pa. and the Cumberland Valley Telephone Co. of Harrisburg, Pa., for authority by the Bell company to acquire certain properties of the Cumberland company for $795,100, and the Cumberland company to acquire certain properties of the Bell company for $1,218,800, on account of there being a duplication in plant and service in various sections of Pennsylvania.

ALABAMA.

June 4: Petition of the Orrville Telephone Co., of Orrville, requesting authority to put into effect an increased rate schedule, dismissed upon request of the company which stated that a number of subscribers had refused to pay the proposed rates.

ILLINOIS.

May 28: Order issued suspending until October 21, 1930, proposed rates for telephone service in Mt. Morris, stated in rate schedule I. C. C. 4, of the DeKalb-Ogle Telephone Co.

June 17: Rehearing on applications of the Sullivan Home Telephone Co. and the Macon County Telephone Co., now owned by the Illinois Commercial Telephone Co. of Madison, Wis., for increases in rates for toll service in Sullivan, Dalton City, Mt. Zion, and Bethany, stated in I. C. C. Rate Schedules 1 and 3.

June 18: Rehearing in Springfield in the matter of applications by the Corn Belt Telephone Co. for orders making permanent an increase of 25 cents per station per month for service in McLean, Saybrook, Belleflower, Atlanta, Downs, Heyworth, Armington and LeRoy.

June 18: Hearing at Springfield before Commissioner Collins in the matter of application for approval of contract entered into by Wm. J. Pohlman who desires to purchase the undivided one-half interest of the Grafton Telephone Co., Grafton, now owned by Paul L. Carpenter.

June 19: Hearing at Springfield before Commissioner Gilbert concerning the proposed advance in rates for toll service by the Illinois Southeastern Telephone Co. from Shelbyville to Findlay, Windsor, Strasburg, Stewardson, Sigel, Shumway, Cowden, Beecher City, Herrick, Moweaqua, Neoga, and Trowbridge; from Tower Hill to Mode, Westervelt, Findlay, Windsor, Strasburg, Stewardson, Cowden and Herrick; from Humbolt to Charleston, and from Charleston to rural subscribers, stated in rate schedule I. C. C. No. 2, filed by the Illinois Southeastern Telephone Co.

July 8: Hearing at Springfield in the matter of the application by the Illinois Consolidated Telephone Co., for permission to increase its toll rates in Hillsboro. The new rates would also affect Nokomis, Witt, Irving, Butler and Raymond.

INDIANA.

June 9: Amo Mutual Telephone Association authorized to increase its rate. The association has 156 subscribers and the rate was increased from $2.50 quarterly to $2.75. The increase of 25 cents is to be set aside for a depreciation reserve fund.

June 13: Petition of the LaFontaine Telephone Co., of LaFontaine, to increase its rates denied.

KANSAS.

June 16: Hearing at Topeka in the matter of application of C. J. Rose, manager of the Kanorado Telephone Co., Kanorado, for permission to sell his telephone plant and property to J. H. Raile, of Partridge.

June 16: Hearing at Topeka on application of J. H. Raile for a certificate of convenience and authority to transact the business of a telephone exchange at Kanorado.

June 30: Hearing at Topeka on application of E. R. Ruch, owner of the Claflin Telephone Exchange, for permission to sell his plants and properties at Claflin and Beaver, to the Western Telephone Corp.

June 30: Hearing at Topeka on application of the Western Telephone Corp. for a certificate of convenience and authority to transact the business of a telephone exchange at Claflin and Beaver.

June 30: Hearing at Topeka on application of the Farmers Mutual Telephone Co. for permission to sell its telephone plant and property at Altamont to the Kansas Home Telephone Co. whose headquarters are in Topeka.

June 30: Hearing at Topeka in the matter of application of Bert Bradley for permission to sell his plant and property at Benedict to the Kansas Home Telephone Co. of Topeka.

June 30: Hearing at Topeka on the application of the Kansas Home Telephone Co. for certificate of convenience and authority to transact the business of a telephone exchange at Benedict.

MICHIGAN.

June 18: Hearing on the petition of the Michigan Associated Telephone Co. for increased rates in Blissfield, Tecumseh, Dundee and Reading. The company recently applied for permission to discontinue its toll lines, claiming it was not getting sufficient revenue from long distance calls. The hearing will take into consideration the company's physical value as compared with requested rate schedules.

June 10: Sale of four small telephone properties in Ottawa and Allegan counties to the Michigan Bell Telephone Co. approved, and the Bell company's standard rural rates ordered into effect.

The combined sale price of the four companies was $556.

MISSOURI.

June 26: Hearing at Jefferson City on application of the Western Telephone Corp. of Mo., to file a schedule of rates for common battery service at Clarence.

NEW HAMPSHIRE.

June 11: Hearing on proposed transfer of the properties of the Coos Telephone Co. and the White Mountain Telephone & Telegraph Co. to the New England Telephone & Telegraph Co.

NEW YORK.

June 11: New York Telephone Co. filed notice of an increase in the authorized capitalization from $450,000,000 to $575,000,000, the additional $125,000,000 to be common stock. The total authorized stock henceforth will be 5,000,000 common shares and 750,000 preferred shares, of which 3,713,000 common and 250,000 preferred shares are outstanding.

All outstanding common stock is owned by the American Telephone & Telegraph Co. No offering of additional common shares is scheduled. At the close of 1929 the common stock outstanding totaled $280,600,000 in value and $90,700,000 additional was authorized for issuance by the public service commission early in March. This brought the total outstanding to within $3,700,000 of the total common stock authorization.

June 20: Hearing at Albany before Commissioner Lunn on petition of Walker Telephone Co. to construct telephone lines (now mainly constructed) and for approval of such construction, to issue stock.

NORTH DAKOTA.

May 19: Application filed by the Amenia Telephone Co. of America, for permission to establish a connection for toll lines with the Northwestern Bell Telephone Co. at Casselton.

May 20: Application filed by the Kindred Telephone Co. for authority to increase rates in Kindred.

May 20: Application of the Dakota Public Service Co. for authority to establish a new schedule of rates for New Rockford, granted.

OHIO.

June 2: Marion County Telephone Co., of Marion, and its successor the Ohio Associated Telephone Co., ordered to refund to its subscribers $112,000, collected on advanced telephone rates in the Marion area from August 1, 1925, to December 31, 1928.

The commission also ordered the company to place in immediate effect a revised schedule of decreased rates. It also directed refund of $50,000 collected since December 31, 1928.

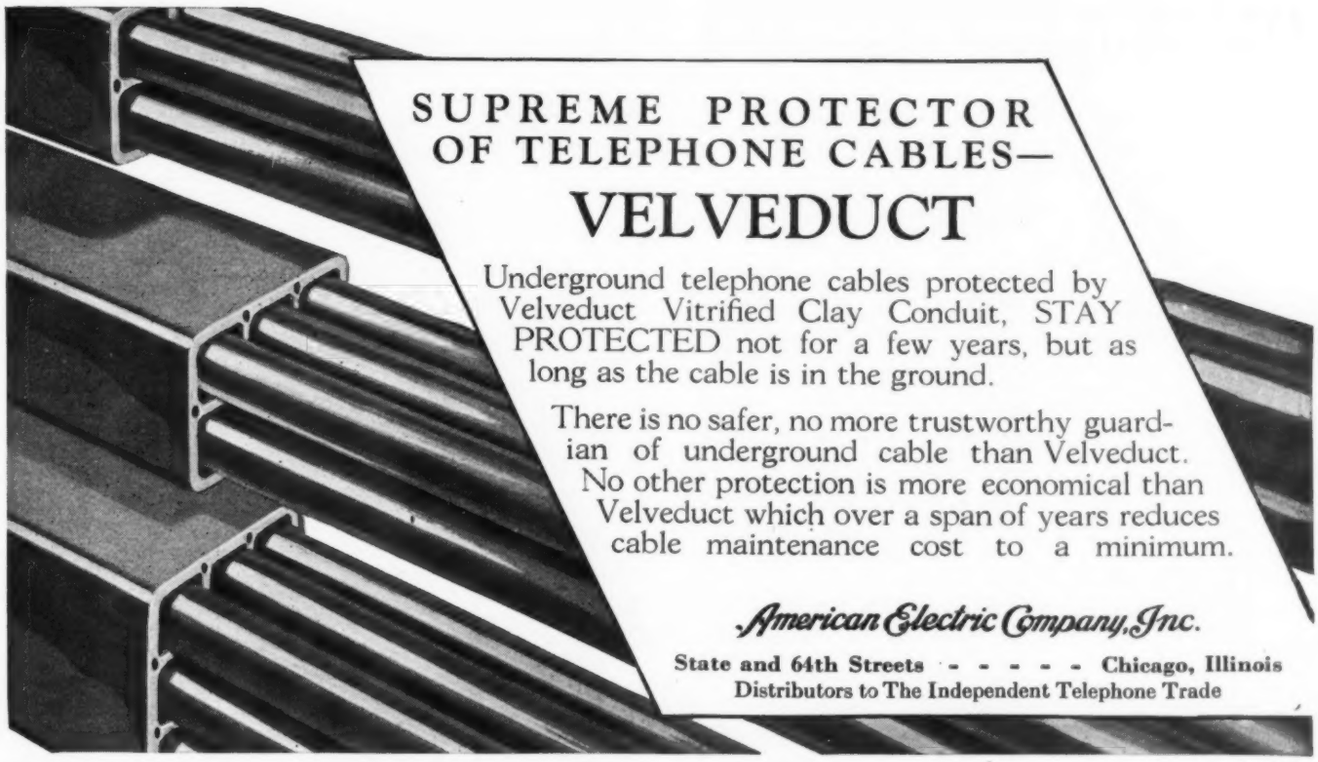
June 4: The Lorain Telephone Co., of Lorain, filed a petition for permission to purchase the Henrietta Rural Telephone Co. and the Riverside Telephone Co., both operating in Birmingham; 150 shares of $100 par preferred stock is to be paid for each company.

PENNSYLVANIA.

June 4: Hearing on complaint filed against the Mutual Telephone Co. of Erie by the Bell Telephone Co. of Pennsylvania.

The Bell company complains that several years ago when it disposed of its Erie-

(*Please turn to page* 39.)



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OF TELEPHONE CABLES—

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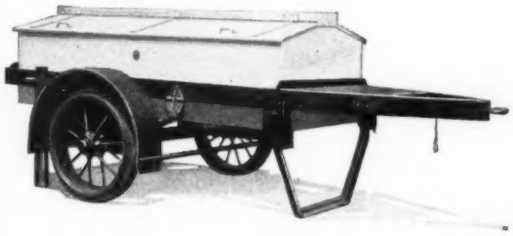
Distributors to The Independent Telephone Trade

VELVEDUCT CLAY CONDUIT
Made By
CLAY PRODUCTS COMPANY, INC., OF INDIANA, BRAZIL, INDIANA



THE ALL-STEEL HEAVY DUTY TOOL BOX

The Littleford Heavy Duty Tool Box is designed and constructed to properly store and transport jack hammers, drills, lead furnaces, shovels, and all other equipment needed by maintenance departments. The All-Steel Box, with low-slung chassis mounted on semi-elliptical springs, will stand the most severe abuse. Rubber tired wheels, with Timken bearings, are standard equipment. Made in two sizes. Write for complete information.

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ALL-STEEL
TOOL BOXES
LITTLEFORD BROS. 423 E. PEARL ST. CINCINNATI, O.

KESTER FLUX-CORE SOLDER
FLUX IN POCKETS
SOLDER WALL
Ready to Use
Needs only Heat
KESTER SOLDER
Flux-Core
EXACT
No more soldering failures—Kester eliminates the guesswork of separate fluxes. Its simple, sure, self-fluxing operation gives positive protection from corrosion and leakage. Use Kester Acid-Core for heavy duty, Kester Rosin-Core for delicate work. Let the Kester research department recommend the exact solder for your particular needs. Insist on Kester Solders.
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FLUX-CORE
SOLDER
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ROSIN-CORE
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METAL MENDER
RADIO SOLDER

Telephone Men Civic Campaign Drive

Community Chest Campaign Workers in Rochester, N. Y., Led by Men Connected With Rochester Telephone Corp. and Stromberg-Carlson Telephone Mfg. Co. as Division and District Chairmen and Sectional Captains—Results of Work

Once more telephone men in Rochester, N. Y., laid aside their duties in telephony to take part in a civic enterprise.

When the leaders of the Community Chest in that city issued a call for campaign workers, 25 men connected with the Rochester Telephone Corp. and the Stromberg-Carlson Telephone Mfg. Co. answered, and they spent seven days helping to raise funds for the needy of Rochester.

J. P. Boylan, President of the Rochester Telephone Corp., and Chairman of the Utility Employe Division, in the Community Chest Campaign.

Geo. A. Scoville, Vice-President in Charge of Sales of the Stromberg-Carlson Company, Was Chairman of the Industrial Employe Division.

Although the goal set for the Chest was not reached, 600 campaign workers raised $7,000 in excess of that raised last year. Telephone campaigners were given high praise for the outstanding work they had done in the drive as their groups stood out throughout the drive.

Three of these men were division chairmen: J. P. Boylan, president of the Rochester Telephone Corp. was chairman of the utility employe division; W. J. O'Hea, secretary of the Telephone Corp. was chairman of the individual subscriber division; and Geo. A. Scoville, vice-president in charge of sales of the Stromberg-Carlson Telephone Mfg. Co., was chairman of the industrial employe division.

Three men were district chairmen: Warren T. Eastwood, advertising manager of the Stromberg-Carlson company, was chairman in the industrial division; E. W. Wirth, superintendent of buildings and supplies for the telephone corporation, chairman in the individual subscriber division; and Frank T. Byrne, commercial superintendent of the telephone corporation, chairman in the industrial division.

The following were sectional captains: Stuart G. Bowie, auditor for the telephone corporation, captain in the utility division; Robert M. Bruce, plant superintendent of the telephone corporation, captain in the utility division; George E. Eyer, assistant to the president of the Stromberg-Carlson company, captain in the industrial division; and C. A. FitzMorris, of the Stromberg-Carlson employes relations department, captain in the industrial division.

S. R. Curtis, of the Stromberg-Carlson purchasing department, was in charge of

Robert M. Bruce, Plant Superintendent of the Rochester Telephone Corp., Was Captain in the Utility Division.

Warren T. Eastwood, Advertising Manager of the Stromberg-Carlson Telephone Mfg. Co., Chairman in Industrial Division.

Frank T. Byrne, Commercial Superintendent of the Rochester Telephone Corp., and Chairman in the Industrial Division.

TELERING

For Central Office and PBX Ringing
IN USE ALL OVER THE WORLD

ONE REED!

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IDEAL WAVE FORM

REDUCE YOUR RINGING COST

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Converts 60 Cycle Lighting Current to 20 Cycle Ringing Current

POSITIVELY NO RADIO INTERFERENCE

Very low current consumption.

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How to Improve Your Service

Replacing transmitters is one of the best methods of improving your service. Send us all the used transmitters you have on hand, for rebuilding. Then when you have put these out, send in the ones you have picked up. In this way you will soon have all your transmitters in perfect working order without buying any new equipment.

Prices for Transmitter Renewal

The following prices do not include nickel plating, broken or missing parts, but do include new gaskets and fresh granular carbons. Each transmitter adjusted to voltage you specify.

One only 50c	11 to 50, each.....35c
2 to 10, each.....40c	51 to 100, each.....30c
101 to 500, each.....25c	

Suttle Equipment Co.
FACTORY AND MAIN OFFICE
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FORMERLY "BALKITE"

Cut Power Costs 50%

BY equipping PBX boards, magneto boards, or even small central office boards with good storage batteries, "floated" on Fansteel Chargers, you improve service, *and at the same time greatly reduce your power costs.*

Service is improved by keeping circuits right up to their rated voltages, *all the time*, with fully charged batteries, charged while they operate. Efficient filter circuits, built into Fansteel Chargers, *eliminate every trace of charging noise.*

Cost is lowered (some cases on record cut over 50%) through the elimination of costly attendance and maintenance, damage to cable pairs and investment in duplicate batteries. Batteries charged continuously at low rates, with Fansteel Chargers, last longer, deposit less sediment, require less water and attention. *Investigate!*

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Kellogg Switchboard and Supply Company
1020 West Adams Street, Chicago

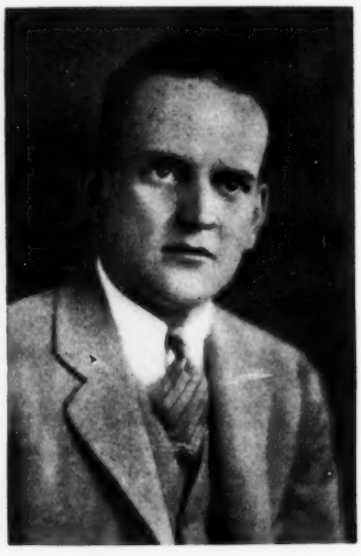
FANSTEEL PRODUCTS COMPANY, Inc.

NORTH CHICAGO, ILLINOIS

C. A. FitzMorris, of the Stromberg-Carlson Employes' Relations Department, Was Captain in the Industrial Division.

Stuart G. Bowie, Auditor for the Rochester Telephone Corp., Rochester, N. Y., Was Captain in the Utility Division.

George E. Eyer, Assistant to the President of the Stromberg-Carlson Company, Was Captain in the Industrial Division.



S. R. Curtis, of the Stromberg-Carlson Purchasing Department, Rochester, N. Y., Was in Charge of the Community Chest Campaign in His Company.

W. J. O'Hea, Secretary of the Rochester Telephone Corp., Rochester, N. Y., Was Chairman of the Individual Subscriber Division, Community Chest Campaign.

E. W. Wirth, Superintendent of Buildings and Supplies for the Rochester Telephone Corp., and Chairman in the Individual Subscriber Division.

the campaign in his company, and E. W. Wirth was in charge of the telephone corporation drive.

The utility division, under Mr. Boylan, received 7,012 pledges totalling $35,360.95 or 101 per cent of its quota. The industrial subscriber division, under the direction of Mr. O'Hea, had 13,730 pledges and a total of $710,889.44, which was 96 per cent of its quota. The 50,192 industrial employes, the group under the direction of Mr. Scoville, pledged $211,138.57, or 97 per cent of its quota.

Rochester Telephone Corp employes contributed $7,100, which was 103 per cent of their quota. There were 1,450 employes who made pledges, making an average pledge of $4.90. In addition to this sum, the corporation gave $6,000.

Stromberg-Carlson had 1,573 pledges or a total of $10,566.63, and an average pledge of $6.71. This was 130 per cent of the company's quota.

Homeric Begins Ship-to-Shore Telephone Service to U. S.

The radio-telephone equipment on the White Star liner Homeric, bound for the United States from Southampton, was put into regular service on June 5 for use by the passengers in communicating with North America. Through the American Telephone & Telegraph Co.'s short-wave radio sending and receiving stations at Deal, N. J., and Forked River, N. J., conversations may be held between the liner while at sea and any Bell telephone. The service also extends to all of Cuba and to the majority of telephones in Canada and Mexico.

The Homeric is the fourth transatlantic liner to be equipped for regular ship-to-shore telephone service to North America. The others are the Leviathan of the United States Lines, and the Majestic and Olympic, also of the White Star line. The radio-telephone transmitting and receiving equipment aboard the Homeric is owned and operated by the Marconi International Marine Communication Co., Ltd.

WHAT THE COMMISSIONS ARE DOING.

(*Continued from page* 34.)

owned properties to the Mutual, the latter entered into an agreement to confine itself to the rendering of local service only and not attempt to supply toll service outside of the city, even in points located wholly within Erie county.

This agreement, the Bell attorneys now set up, has been violated by the Mutual and they seek a ruling in the matter at the hands of the commission.

FINE TELEPHONE SERVICE FOR PALMYRA, MO.

(*Continued from page* 30.)

and rings the subscriber, the revertive ringing tone is given to the calling subscriber. This tells him that the operator is ringing the bell of the party who is being called.

Immediately back of the operating room is the terminal room which houses the main distributing frame, the relay rack, and the five-frequency harmonic pole-changers. In this terminal room is also located a floor-type wire chief's desk, which makes testing convenient.

The exchange is housed in a newly-purchased building, which was remodeled to suit the requirements for the new service. A policy of the company is to have the switchboard and operators in full view of the public on entering the telephone offices. The public entrance was placed to the extreme left of the building. To the right upon entrance is a lobby containing long distance booths.

The commercial office is on the left of the entrance, with the switchboard paralleling the wall of the building. The front third of the building is used for the commercial office and operating room, with the terminal and operators' restroom immediately to the rear. The extreme rear end of the building is used as a garage and storeroom.

The Western Telephone Corp. of Missouri has expended a large amount of money in rebuilding this system and its subscribers have already shown their appreciation of the company's efforts in its endeavor to give Palmyra a thoroughly modern plant with the up-to-date service.

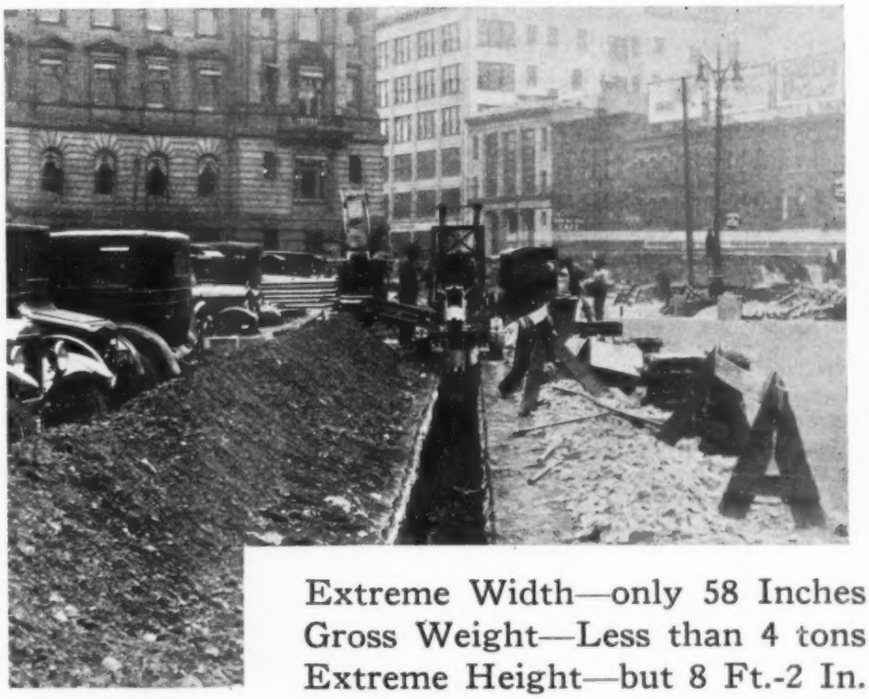
Concession Granted for Radio-telephone Service in Cuba.

By a presidential decree sent to the Official Gazette early this month the Insular Radio-Telephone Co. is authorized to establish service throughout Cuba and with foreign countries.

According to the terms of the concession, employes, except technical, of the company must be Cubans. Another clause gives the president of the republic power to change the service rates.

Within two years of the publication of the concession the company must have installed at least one transmission and receiving station.

THE CLEVELAND BABY DIGGER



Extreme Width—only 58 Inches
Gross Weight—Less than 4 tons
Extreme Height—but 8 Ft.-2 In.

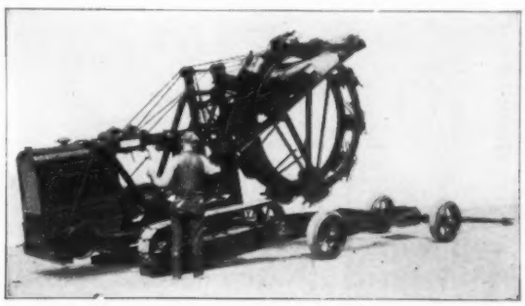
FAST—POWERFUL—MOBILE

FROM the specifications shown it is easy to see why the Baby Digger is the logical machine for digging underground conduit trench, and to understand why its special design enables it to meet all the requirements of this class of work.

Its unequalled ability to move quickly and easily on its own specially built trailer (loading time five minutes), its extreme compactness which permits it to slip by obstructions normally encountered when working in built-up sections of the country, as well as its fine, modern mechanical construction—all of these are really vital reasons why the Baby Digger is the equipment for your trench digging.

Add to these features its advanced design, abundant power, and unsurpassed ruggedness and you will further understand why Cleveland Baby Diggers are delivering maximum performance in the toughest and hardest soils—doing more work for less money.

Write today for copy of our new catalog No. 10 and full information.



THE CLEVELAND TRENCHER COMPANY
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New Telephone System for Osceola, Iowa

Middle States Utilities Co. Consolidates Competitive Plants—Purchases and Remodels Exchange Building—New Switchboard and Power Equipment Installed—Outside Plant Rebuilt—Other Details of Improvements and Changes

By H. A. White,

Manager, Kansas City Branch Office, American Electric Co., Inc.

The complete reorganization of the telephone facilities of Osceola, Iowa, might well be said to be a typical example of the improvement taking place throughout the Middle West in the matter of giving high-grade and unified service where formerly competitive telephone systems existed.

Osceola, Iowa, is a progressive community located on the Chicago, Rock Island & Pacific R. R., in the northwestern part of the state. For several years it had two telephone systems: one known as the Clark County Mutual Telephone Co. and the other operated by the Northwestern Bell Telephone Co. Recently, however, the Middle States Utilities Co. purchased the Mutual company and a short time after, acquired the local Bell plant.

M. L. Golladay, general manager of the company, assisted by Thomas Epperly, district manager, immediately formulated plans for the consolidation of the two systems. The first step taken was the purchase of a building as a permanent home for the new exchange. Here the company was fortunate in obtaining the building in which the Bell exchange was housed.

The building being directly across the alley from the Mutual company's office, the work of consolidating the two outside plants was a great deal more simple than if the two plants had been widely separated. As it was apparent that increased equipment would have to be installed, the building was completely remodeled.

The next step was the selection of new exchange apparatus. John J. Cline, chief engineer of the company, made a careful study of all types of equipment and finally called in engineers of the American Electric Co. It was decided that a monotype senior switchboard was the most suitable equipment for the new conditions. Other apparatus ordered included new power equipment and main frame.

M. L. Golladay, Holden, Mo., General Manager of the Middle States Utilities Co.

Immediately following this, the work of rebuilding the outside plant was begun, and in 90 days the entire project was completed, including the installation of the new central office equipment.

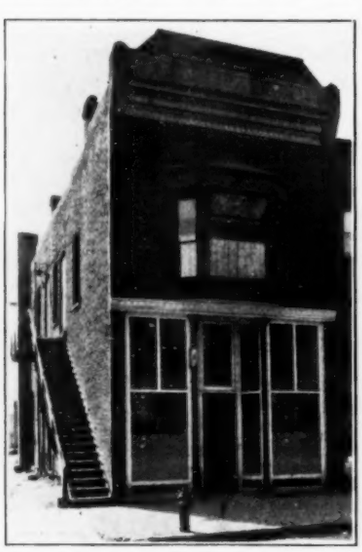
The new five-position American Electric switchboard is of the unit-type multiple with associated line lamps. Three of these positions are for local lines, one for rural lines and one for toll.

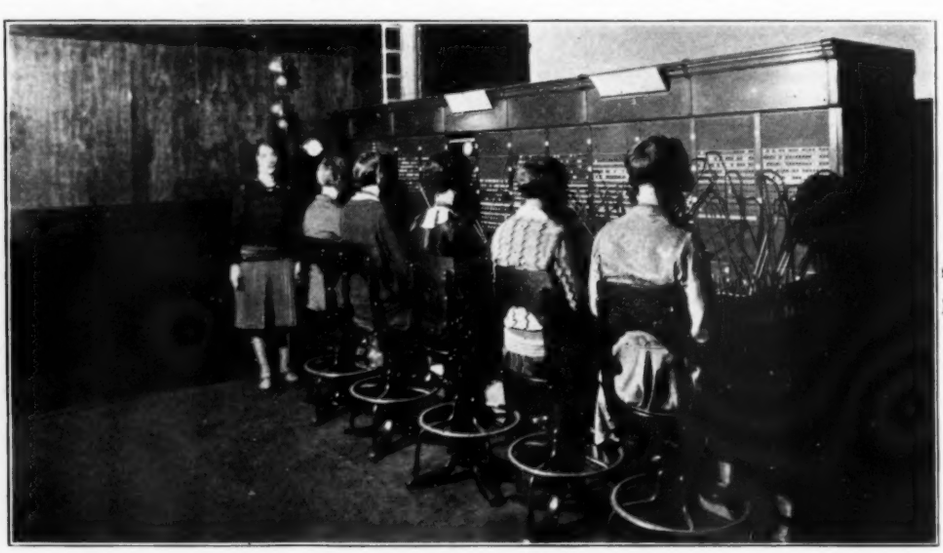
The ultimate capacity of the board is 1,200 local lines with 680 local lines equipped and 60 rural lines equipped. The line circuits are mounted in the equipment space on a four-panel multiple basis. All rural lines have flashing lamp magneto supervision, and the cord circuits throughout the board are full universal.

The ringing equipment installed supplies five-party harmonic ringing with instantaneous cut-off. Auxiliary equipment supplied with the switchboard included relay rack, set of cables, cable runway, and main distributing frame.

On the night of the cutover, the office and operating room were filled with flowers sent by the business men of the town to express their appreciation of the large investment made by the telephone company to give them unified and improved service.

The first call was placed by Mayor Robinson, who later said a few words in congratulation to W. E. Hahn, local manager and other officials of the Middle States company in attendance, including M. L. Golladay, general manager; Thomas Epperley, district manager, and John J. Cline, chief engineer. Installation of the central office equipment was supervised by W. H. Liddle, Jr., equipment engineer.





Exchange Building of Middle West Utilities Co., Osceola, Iowa—View of Operating Room and New American Electric Switchboard.

Condensed Telephone News

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items Relating to Construction, Rebuilding, or Changes in Their Plants and Systems

New Incorporations and New Telephone Companies.

STAR CITY, ARK.—The Southeast Arkansas Telephone & Power Co. has been incorporated by Sydnor Hall, 1811 Morgan street, St. Louis, Mo., and Lamar Williamson, of Monticello, Ark. The company is to operate telephone, electric light and ice plants.

Construction.

BERRYVILLE, ARK.—The Berryville Telephone Co. is constructing a new toll line from Berryville to Blue Eye, Mo.

ANAWAN, ILL.—Underground cable is being laid to replace open wire in the local plant of the Henry County Telephone Co. The work is in charge of F. R. Peterson, of Atkinson.

OAKLAND, ILL.—The Illinois Southeastern Telephone Co. with headquarters at Mattoon plans to build a new toll line from Oakland via Ashmore to Charleston. This line will carry two copper circuits and the wire will be strung east to Redmon. The company will also remodel the office quarters.

LANSING, MICH.—The new 38-mile storm-proof cable of the Michigan Bell Telephone Co. between Lansing and Jackson is now in service. It makes a total of 745 miles of long distance cable in the state controlled by the company and marks the completion of a $9,500,000 trans-Michigan cable system.

BUCYRUS, OHIO—One thousand new poles and 4,000 feet of wire, in addition to a large quantity of other equipment, were necessary to rebuild lines of the Bucyrus Telephone Co. which were torn down last January when a severe sleet storm swept that section. The company has also purchased the New Winchester telephone exchange and is preparing to install new equipment for long distance service.

SPEARMAN, TEXAS—The Western Telephone Corp. of Texas, with district headquarters in Guymon, Okla., will begin the construction of a new and modern telephone plant at Spearman on August 1. The improvements will include a big brick building which will be used as telephone offices and storage rooms. Another direct toll line to Amarillo is also being erected, which, when completed, will give Spearman two direct lines leading south and southwest to the outside world, which will be especially convenient during the harvest season rush.

Financial.

ANTIGO, WIS.—The Langlade Telephone Co. has decreased its preferred capital stock from $200,000 to $50,000.

Franchises.

BROWNSVILLE, TEXAS—Renewal of the charter granted to the Rio Grande Telephone Co. by the city 24 years ago has been granted with the provision that extensive improvements be made by the company, including the placing of certain lines underground and the erection of a new central building at a cost of about $50,000. The company was allowed a raise of 25 per cent on one-party residence telephones and a 25-cent addition to the present rate on extensions. Present rates are: Business, $4; one-party residence, $2.25; two-party residence, $2.

FAIRBURY, ILL.—The city council of Fairbury recently granted the Illinois Commercial Telephone Co. a five-year franchise to operate a telephone plant in Fairbury.

Miscellaneous.

FAIRFIELD, ILL.—Elbert Leighty succeeds W. H. Heckler as manager for the Illinois Commercial Telephone Co. here. Mr. Heckler has been ill for some time past and will be transferred to some other place when he is able to work.

LARUE, OHIO—Property of the Larue Telephone Co. operating in western Marion county, was sold to the Ohio Associated Telephone Co. with central offices in Marion, for $27,000. The Larue company went into a receivership recently as a result of a debt incurred by storm damage last winter. The Associated company plans to reconstruct the lines.

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Locust Pins — Oak Brackets

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220 Broadway—NEW YORK

Strowger Dial Service at Dowagiac, Mich.

New Automatic Switching Equipment Will Provide Service to 1250 Subscribers Living in Resort Area of Michigan Occupied by 7,500 People—New Telephone Building Will Serve as the Dowagiac Headquarters of Tri-County Telephone Co.

By R. H. Burfeind,
Sales Engineer, Automatic Electric Inc.

Organized in 1927 and starting in business in November of that year, the Tri-County Telephone Co., South Haven, Mich., now owns and operates some 32 exchanges located in 13 counties of Michigan. The number of stations served by these properties totals over 16,000, which number is being added to by steady daily growth.

Attractive New Home of the Tri-County Telephone Co., Dowagiac, Mich., Which Houses the Company's District Commercial Offices and Dial Equipment.

The territory served by the company embraces areas which have a diversified industrial and agricultural development, and includes a large section of Michigan's valuable limestone deposits and fruit-growing land. Three of the company's exchanges are now converted to dial operation.

The Tri-County's record of commercial development and expansion is largely explained by its activities in bringing the physical plants of its various properties up to a modern level of efficiency. The latest step in this policy of giving the telephone-using public modern service is the conversion of the Dowagiac exchange to dial operation. This development was brought to its successful completion largely through the efforts of Dr. O. M. Vaughan, of South Haven, president of the Tri-County Telephone Co., ably seconded by A. B. Chase, secretary-treasurer, and by William F. Hoyt, of Dowagiac, district commercial manager of the company.

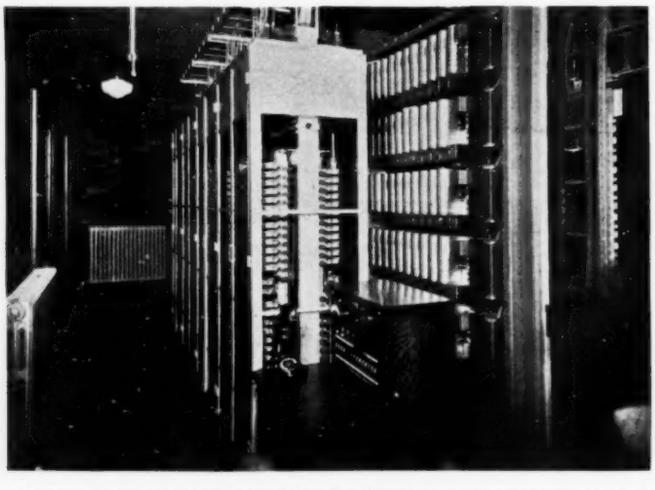
The final steps in the conversion of the Dowagiac exchange to dial operation were taken on the evening of May 27, in the presence of a large number of company officials and visiting telephone men. In the afternoon preceding the cutover, golf was enjoyed on the excellent Dowagiac course, and this was followed by a banquet, the feature of the evening ceremonies.

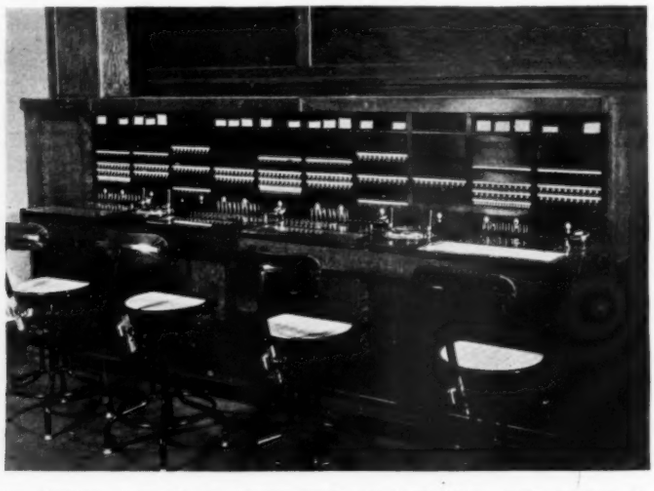
Among those present were Dr. O. M. Vaughan, president and general manager; A. B. Chase, secretary and treasurer of the Tri-County Telephone Co.; Emmett P. Platt, former Dowagiac manager, now of Alpena; W. A. Dickinson, E. E. Hobday and H. Cavanaugh. Representing the manufacturer of the dial equipment, Automatic Electric Inc., were E. R. Neir, assistant chief engineer, and J. H. Hazlett, superintendent of installation and operation.

Dowagiac is the gateway to one of the most popular vacation and resort sections of Michigan. The name "Dowagiac" was first applied by the Indians to the swift-running stream which flows through that region, and means "River of Many Fishes." That this name has not lost its significance in our modern, machine-age civilization is attested to by the many users of fishing tackle which bears this name, and which is manufactured in Dowagiac. Besides being known for its fishing tackle, the city is also noted as being the home of the stove and furnace industry.

The new telephone building is of the bungalow type. Its decorative brick construction, and the attractive landscaping job which has been done with plants and shrubs, enhance the appearance of the corner lot which it occupies. The building is a distinct addition to the neighborhood.

Seven hundred lines of Strowger dial equipment are installed at present, which will serve some 1,250 subscribers. The lines of equipment are divided into the following classifications: 450 individual lines, 115 four-party lines, 75 rural lines and 50 P. B. X. lines. The population of the area served by the new installation totals ap-





General View of Strowger Dial Equipment at Dowagiac, Mich., With Testing Turret in Foreground—Four-Position Toll Board at Dowagiac, Furnished by Automatic Electric Inc., Manufacturer of the Dial Equipment.

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Western Elec. No. 323 Transmitters complete with backs @	1.25
Western Elec. No. 143 Receivers complete with cords @	1.25
Western Elec. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm Bdg. magneto hotel sets with W. E. Trans. & No. 122 Rec. @	5.75
Western Elec. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm desk set, signal sets with No. 13 Ind. Coil @	4.50
Western Elec. No. 315 inside connection 3-bar 1000-1600 or 2500 ohm desk set signal sets @	5.75
Leich 30-42-54 and 66 cycle Harmonic Ringers with gongs @	1.25
New Cabinet inside connection compacts with Kellogg or W. E. Transmitters & Rec., 3-bar 1000-1600 or 2500 ohm $9.50—4-bar @ $10.50—5-bar @	11.50
Kellogg No. 79 C. B. Induction coils @	.40
Western Elec. No. 22 3-bar Bdg. Generators with cranks @	1.65
Stromberg 4-bar A. C. or Pulsating current Gen. with crank @	2.25

Write for Bulletins

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1940 West 21st Str., Pilsen Station, Chicago, Ill.

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WANTED—12 to 25 5-bar compact or wall type telephone cabinets. Address Dyvig Elec. Shop, Inwood, Ia.

WANTED TO BUY—A small telephone plant. West preferred. Address 7773, care TELEPHONY.

WANTED TO BUY—Telephone exchange from 200 to 500 stations. Write at once giving full details. Fred Sinkbeil, Lynch, Nebraska.

FOR SALE

H. C. HEAVY duty motor generator ringing set. 110 volt, $60.00. Porcelain knobs, 2 groove, $10.00 per 1,000; 4 groove, $20.00 per 1,000.

Bakelite mouth-pieces for W. E. transmitters, $6.00 per 100.

W. E. No. 14 cable terminals 16 pair with stubs @ $4.50.

New, Reliable, 16 pair unprotected cable terminals with stubs @ $5.00.

TELEPHONE REPAIR SHOP
6966 Ravenswood Ave., Chicago, Ill.

FOR SALE—11 No. 6 Kellogg Converters in A-No. 1 shape. Inquire F. M. Strasser, Lincoln Telephone & Telegraph Company, Lincoln, Nebraska.

FACTORY REBUILT TELEPHONES—Leich 3 and 4 bar 1000 ohm bridging compact magneto wall and desk telephones. Same guarantee as new equipment. Good values. Price on application. Leich Electric Co., Genoa, Ill.

FOR SALE—Telephone plant, Miller, Mo.; 195 stations. Can be increased to 400 stations in short time. Price $65.00 per station. P. G. Isaacs, Miller, Mo.

POSITIONS WANTED

POSITION WANTED—Cableman, 27 years old, 9 years' Bell experience, with thorough knowledge of Wheatstone bridge. Address 7769, care TELEPHONY.

CENTRAL OFFICE PROTECTION

Cook No. 100 type (per line)	**$0.85**
Cook No. 10 type rubber insulation (per line)	**.65**
Cook No. 10 type micarta insulation (per line)	**.75**
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Cook D-67523 (formerly Automatic Electric Co. type), new (per line)	**.50**
Cook No. 14 type, new (per line)	**.60**

Buckeye Telephone & Supply Company

1432 South Parsons Avenue

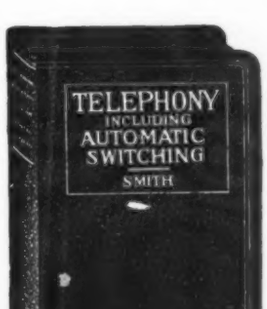
COLUMBUS, OHIO

POSITIONS WANTED

POSITION WANTED—With telephone company as manager, plant superintendent. Ten years, central office equipment, plant construction, maintenance; 15 years' manager, plant superintendent. Right man for isolated or group of exchanges where general supervision is required. Best references. Address 7761 care of TELEPHONY.

GENERAL MANAGER of large telephone system with experience abroad and in the U. S. A., thoroughly up-to-date in the designing, construction, maintenance and operation of telephone plants, large experience also in securing franchises for public utility companies in South America, wishes to associate himself with either large or small telephone company. Could furnish additional capital for telephone system requiring same. Address 7772, care TELEPHONY.

WANTED—Cable-splicing. Will consider job as local manager or repairman in connection with job as splicer. Best references. Address 7774, care TELEPHONY.



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proximately 7,500, including not only Dowagiac proper, but the district surrounding it.

Self-aligning plunger line switches are furnished on this installation. All equipment is mounted on standard height frames. Five-frequency harmonic ringing is used, allowing as many as ten parties on a line. The ringing vibrators are provided in duplicate, so that in the event of failure for any reason of the set in operation, the reserve set can be switched into action immediately. A 12-ampere rectifier provides power to operate the equipment and maintain the storage battery in a charged condition. The charging is controlled automatically by means of high-low voltage relays.

A four-position toll board was furnished by the manufacturer of the automatic equipment. In addition, there is also provided a testing turret, and a chief operator's turret. Information and complaint calls are handled at the latter position during the day. This position is multipled with the toll board where such calls are handled during the night.

Prices in the Metal Markets.

New York, June 17: Copper—Easy; spot and nearby, 11¾@12c. Iron—Quiet; No. 2 f. o. b. eastern Pennsylvania, $18.00@19.00; Buffalo, $16.00@16.50; Alabama, $12.00@14.00. Lead—Quiet; spot New York, 5.40c; East St. Louis, 5.30c. Tin—Easy; spot and nearby, $29.50; future, $29.75. Zinc—Quiet; East St. Louis spot and future, 4.50c. Antimony—7.10c. Quicksilver, $120.00.

THEODORE GARY AND COMPANY
KANSAS CITY, MISSOURI
Eighty-eighth Consecutive Quarterly Dividend
The regular quarterly dividends of 40c a share on the No Par Preferred Stock and the usual dividend on the Common Stock has been declared payable July 1, 1930, to the stockholders of record as of the 30th day of June, 1930, at 3:00 p. m. The books will be closed to transfer on June 20th and re-opened on July 1, 1930.
(Signed) C. A. BENNETT,
Senior Vice-Pres. and Treas.
June 16, 1930.

Diversified Investments Incorporated
Kansas City, Missouri
The regular quarterly dividends of $1.75 per share on the 7% First Preferred Stock; $1.00 per share on the Participating Preferred (formerly Class A) Stock; $1.00 per share on the Class C Stock and dividends on the Class A Common Stock payable either in stock at the rate of 1/50th of one share, or in cash at the rate of 50c per share will be paid on July 15, 1930, to the stockholders of record on July 1, 1930 at 3:00 o'clock P. M.
An extra cash dividend of 50c per share will also be paid on the Class A Common Stock on July 15, 1930.
V. E. CHANEY,
Vice President and Treasurer.

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